# The Engineering and Mining Journal

VOL. LXXXV. NEW YORK, MAY 9, 1908. NO. 19.

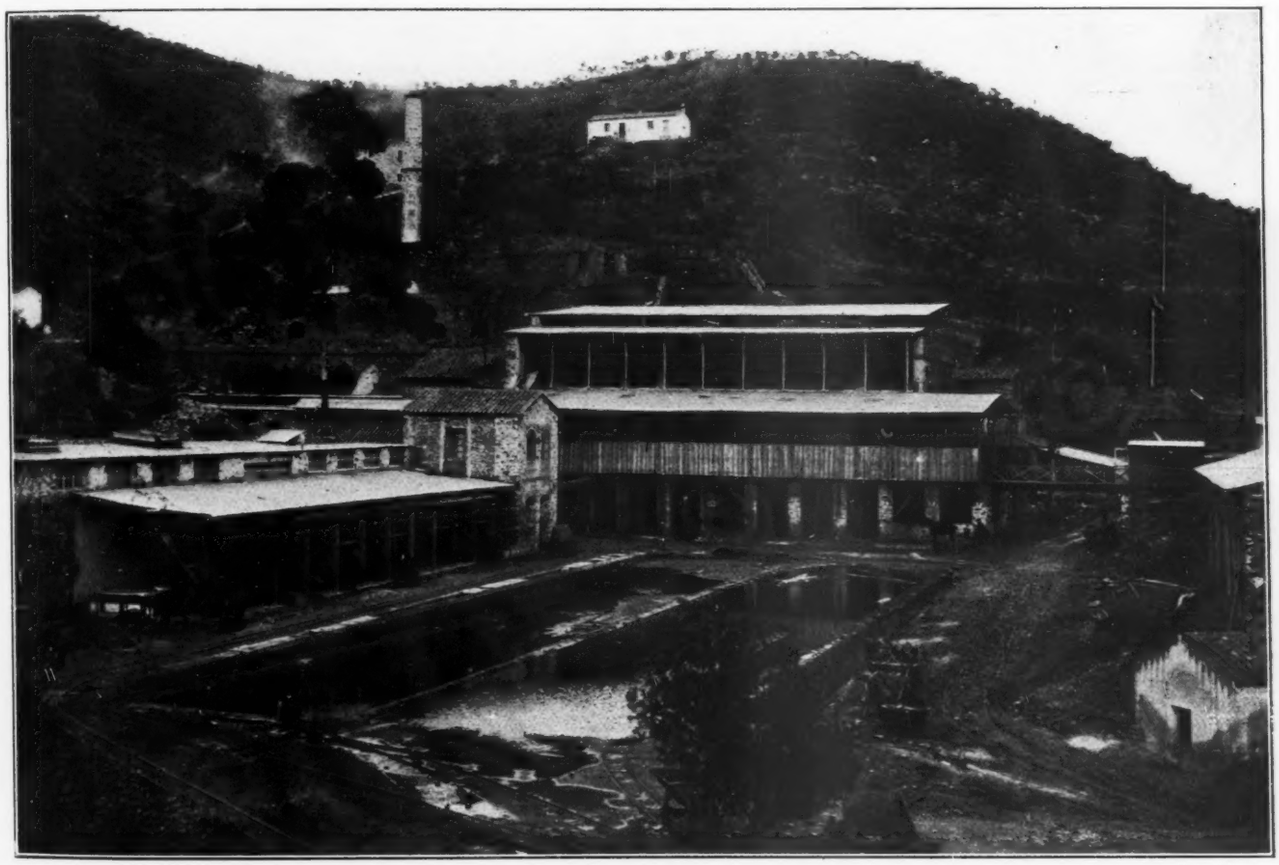

# Concentrating Mixed Ores at Rosas, Sardinia

## The Separation of Lead and Zinc from Mixed Oxidized and Sulphide Ores by Crushing in Ball Mills and Washing over Ferraris Tables


BY UMBERTO CAPPA*


The concentrator at Rosas treats two varieties of ore: Mixed sulphides of lead and zinc, and the mixed oxidized ores of the same two metals.

It was on ores of the first class that concentrating tests were begun in 1900, and after much consideration the Société de Rosas adopted the advice of its consulting engineer, Sr. E. Ferraris, to grind the entire amount of concentrating ore to a fine mesh in ball mills, at the first step. This method has proved the most economical solution of the problem.



EXTERIOR OF CONCENTRATION WORKS AT ROSAS

### Sulphide Ores

The ores first treated were rich. They came from the upper parts of the Rosas deposits, which consisted of diabase dikes mineralized with metallic sulphides, and enriched at the contact with silicious and bituminous limestones. The following table gives analyses of some ores of this kind that were tested:

| | I. | II. | III. |
|---|---|---|---|
| Zinc | 30.80 | 23.50 | 11.20 |
| Lead | 23.60 | 20.25 | 30.00 |
| Copper | .... | .... | 0.20 |
| Iron | 9.00 | 8.00 | 6.50 |
| Lime | 1.50 | 6.25 | 1.18 |
| Magnesia | 0.60 | 0.75 | 0.20 |
| Sulphur | 20.50 | 18.50 | 6.12 |
| Silica and silicates | 13.25 | 22.30 | 43.00 |

Ore No. III had been somewhat oxidized.

Within a short time the apparatus and the working force had become so proficient that ores of much lower grade could be treated. Thus, during 1907, the ore averaged only 13.60 per cent. of zinc, and 8.50 per cent. of lead.

### Oxidized Ores

The oxidized ores were derived by decomposition of the sulphides, particularly at the contact with dolomite. They are intimate mixtures of various silicates and carbonates, of which some are so heavy as to make it difficult to enrich the final products. Unlike the sulphide ores, their percentage of lead is higher than that of zinc, the latter having been leached away by water. The following analyses give an idea of the composition of the oxidized ores:

| | I. | II. | III. |
|---|---|---|---|
| Zinc | 10.65 | 10.37 | 11.40 |
| Lead | 16.10 | 14.25 | 49.75 |
| Copper | 0.55 | 0.70 | 0.14 |
| Ferric oxide | 14.60 | 16.50 | 3.14 |
| Lime | 1.60 | 1.50 | 0.40 |
| Magnesia | 1.22 | 1.00 | 0.25 |
| Sulphur | .... | .... | 1.08 |
| Silica and silicate | 42.44 | 43.76 | 8.35 |
| Carbon dioxide | 12.50 | 10.85 | 17.50 |
| Manganese dioxide | .... | .... | 3.50 |
| Barium sulphate | .... | .... | 2.95 |

Improvements in the process have permitted with these ores, likewise, the treating of low-grade material. Thus, during 1907, the average contents of the ore

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treated were 10.90 per cent. zinc, and 11.60 per cent. lead. It has thus been possible to utilize important orebodies which were abandoned as unprofitable by the earlier owners.

### The Mill

As a result of the success of the first tests, the mill has been enlarged little by little, to keep pace with the mine developments, and now comprises six principal sections and one auxiliary section, with a combined capacity of 80 to 90 tons of crude ore per day of 10 hours. Each section is independent and can run on a different ore from the others.

Each principal section comprises: One ball mill, 1 hexagonal classifier, 4 Harz jigs, 4 Ferraris tables. Every two sections have one rock crusher in common. The auxiliary washery, for the treatment of unfinished tailings, comprises: One trommel, 2 jigs, 11 tables.

The jigs and tables of the principal washery are all on the same floor, and in the same building, which reduces the labor of superintendence. On the ground floor are the decanting tanks for the first cleaning of the slime water, the auxiliary washery, and a pump for circulating the mill water.

### The Apparatus

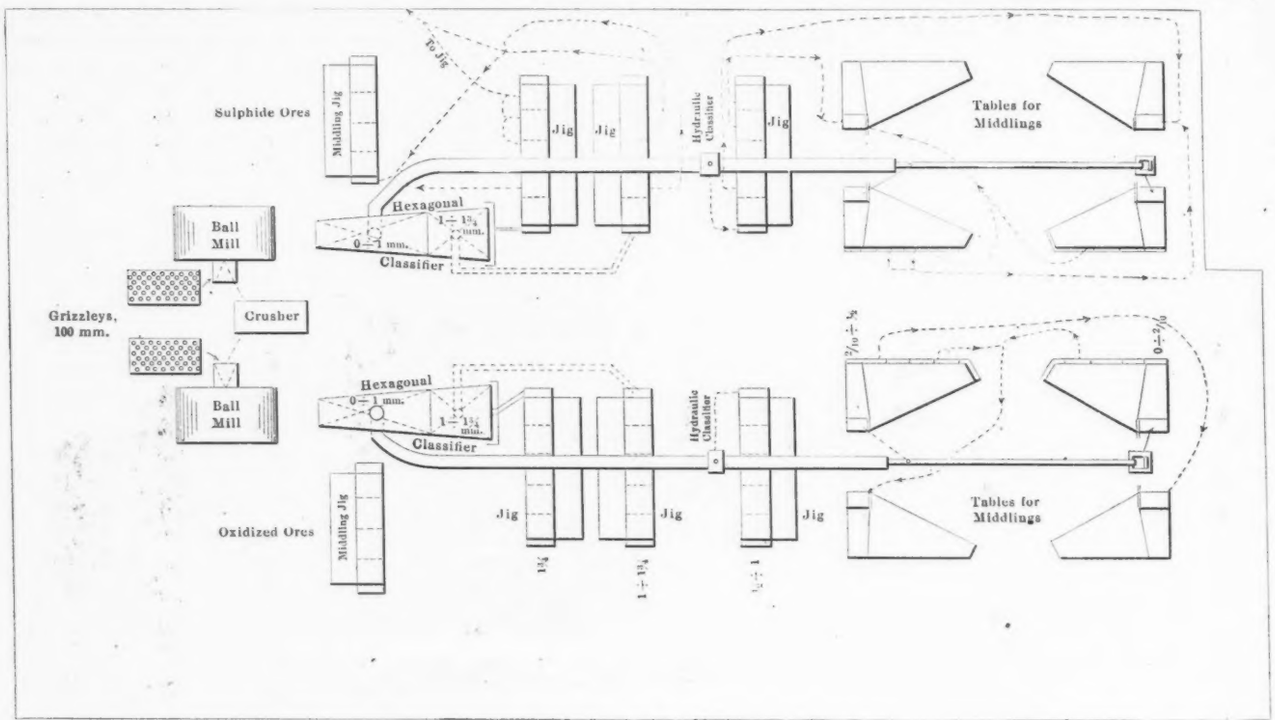
The ball mill is the Krupp No. 4 size, and is loaded with 650 kg. of steel balls. It rotates 27 r.p.m., requires 12 h.p., and is fed 2 liters of water per second. The discharge passes a 2-mm. screen. This machine is costly, but does its work admirably.

The hexagonal classifier is in the shape of a truncated hexagonal pyramid, each face of which is formed by two wooden frames carrying sheets perforated with 1-mm. and 1¾-mm. holes. The frames can quickly and easily be removed and replaced by fresh screens, or with screens of some other mesh. The trommel is constantly rinsed by a jet of water. The trommel rotates 16 r.p.m., absorbs ¼ h.p., and the spray requires 2½ liters per second.

The jigs nearly all have five compartments, and variable eccentrics. A novel kind of discharge was introduced by me some time ago, the arrangement of which is shown in the accompanying sketch. This discharge is used only in the second and third compartments; the concentrate from the other compartments is generally caught in the hutch. The product of the jigs with different ores, is shown in the following table:

| Compartment. | Mixed Sulphides. Rich. | Mixed Sulphides. Poor. | Oxidized Ores. |
|---|---|---|---|
| 1st. Hutch. | Galena. | Galena. | Lead carbonate. |
| 2d. Hutch. | Galena. | Galena. | Lead middling. |
| 2d. Disch'rge | ..... | Blende. | Calamine. |
| 3d. Hutch. | Galena. * | Blende. | Calamine.* |
| 3d. Disch'rge | Blende. | ..... | ..... |
| 4th. Hutch. | Blende. | Blende / middl'g | Calamine.* |
| 5th. Hutch. | Blende. * | Tailing.* | Tailing.* |
| Discard. | Tailing. * | Tailing. | Tailing. |

*Product returned for second treatment.




PLAN OF ONE SECTION OF CONCENTRATING MILL

### SIZING TESTS ON ROSAS MILL PRODUCTS.

A—CRUSHED ORE.

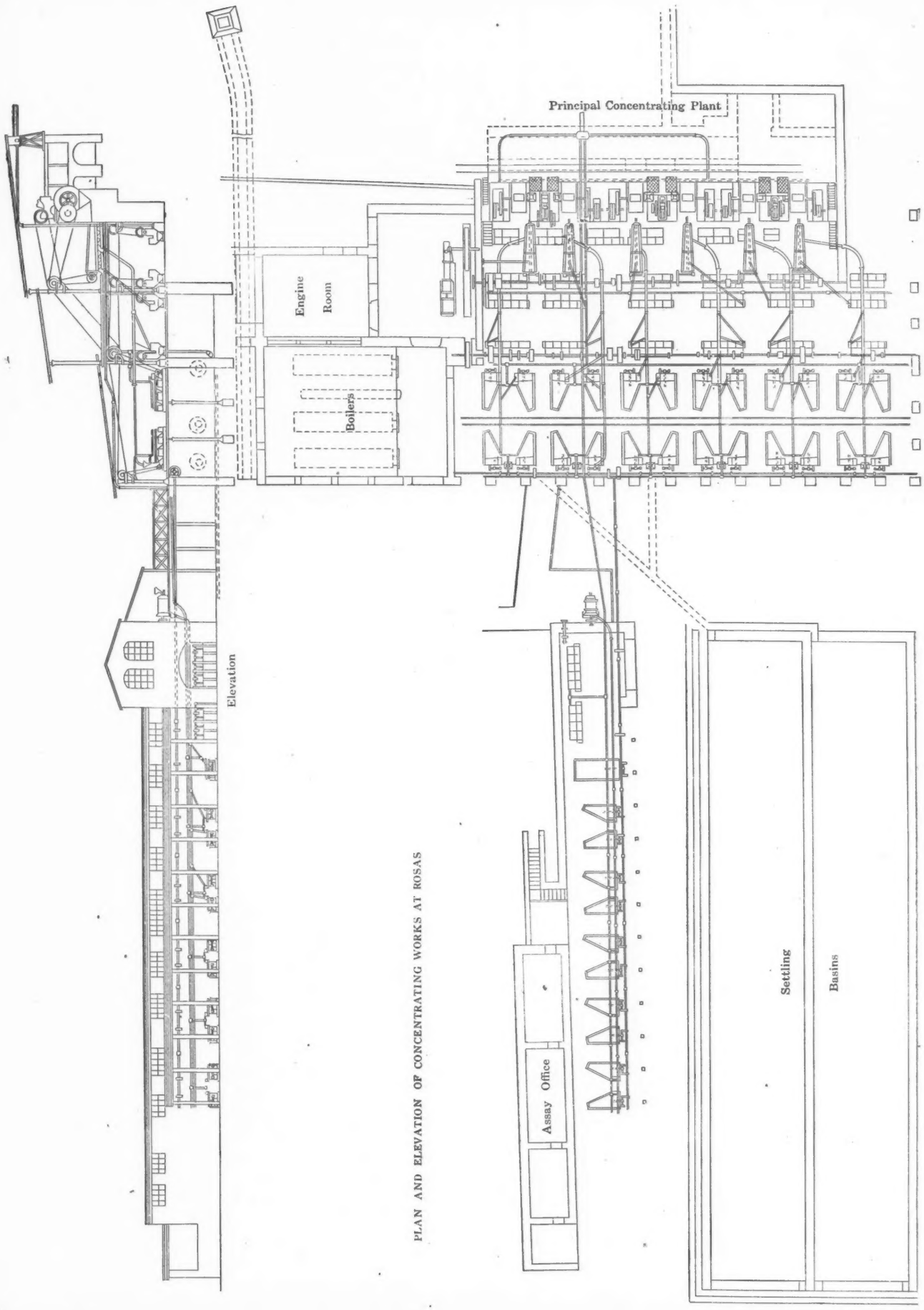
| Mesh. | Oxidized Ores. Weight. | Oxidized Ores. Zinc, Per Cent. | Oxidized Ores. Lead, Per Cent. | Sulphide Ores. Weight. | Sulphide Ores. Zinc, Per Cent. | Sulphide Ores. Lead, Per Cent. |
|---|---|---|---|---|---|---|
| 0.0-0.2 mm | 43 | 12.40 | 11.00 | 18 | 12.80 | 7.80 |
| 0.2-1.0 mm | 31 | 17.60 | 15.20 | 30 | 15.40 | 8.30 |
| 1.0-2.0 mm | 12 | 16.80 | 10.00 | 27 | 14.40 | 6.60 |
| 2.0 mm | 14 | 15.20 | 9.10 | 25 | 14.10 | 5.00 |

C—SLIME—LESS THAN 1-MM. SIZE.

| Mesh. | Settling in First Classifier—To Jig. | Settling in Second Classifier—To Tables. | Settling in Third Classifier—To Tables. |
|---|---|---|---|
| 0.0-0.2 mm | 16 per cent. | 42 per cent. | 87.5 per cent. |
| 0.2-1.0 mm | 60 per cent. coarse. | 58 per cent. fine. | 12.5 per cent. very fine. |
| 1.0-2.0 mm | 24 per cent. very near to 1 mm. | ..... | ..... |

B—HEXAGONAL CLASSIFIER.

| Mesh. | Passing Through 2 mm. | Passing Over 2 mm. |
|---|---|---|
| 0.0-0.2 mm | 2.30 per cent. | ..... |
| 0.2-1.0 mm | 7.80 per cent. | ..... |
| 1.0-2.0 mm | 89.90 per cent. | 12.00 per cent. |
| 2.0 mm | ..... | 88.00 per cent. |




PLAN AND ELEVATION OF CONCENTRATING WORKS AT ROSAS

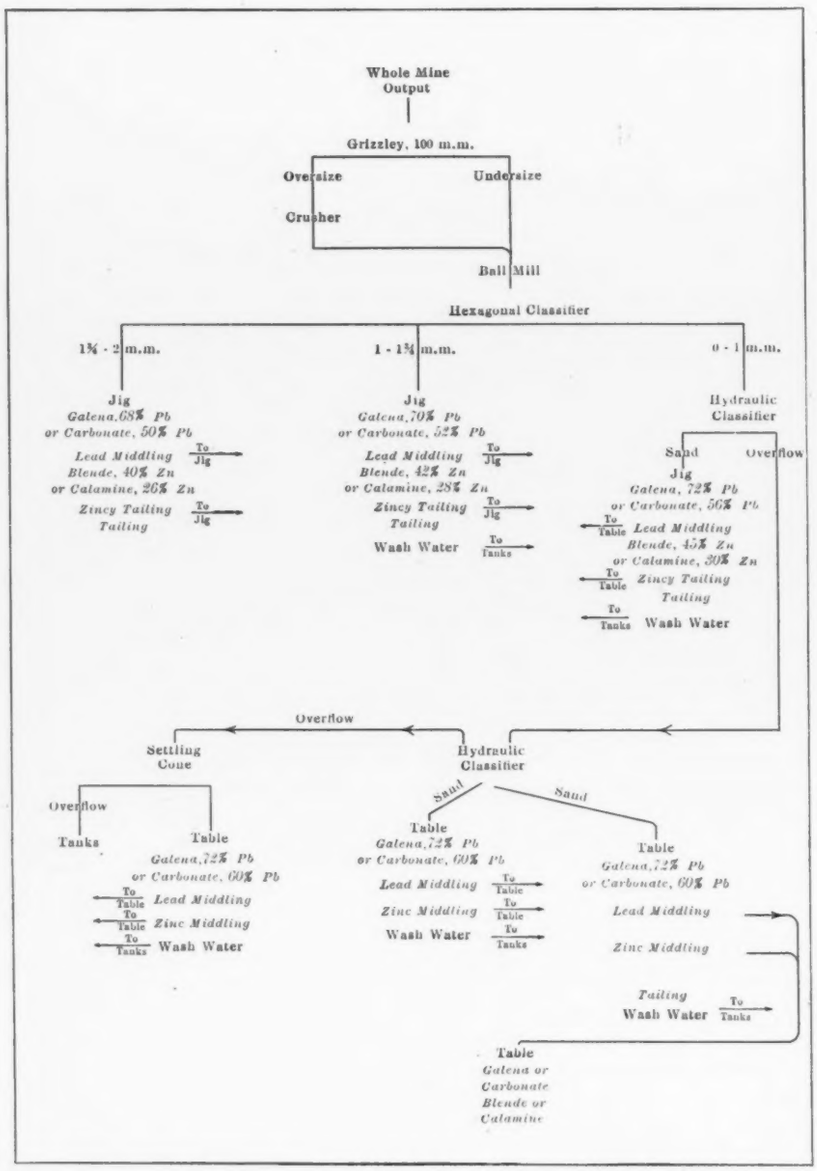
The jig bed is composed of iron disks, 6 to 10 mm. in diameter; the thickness of the bed is 80 mm. in the first compartments and less in the others. The coarse jigs, treating sands of over 1 mm. diameter, make 180 strokes per minute, and the fine jigs make 220 strokes per minute; the length of stroke being respectively 18 and 14 mm. The amount of water required is 1½ to 2 liters per second, and the power required is 1¼ h.p. The four-compartment jigs are used for treating coarse sand of over 2 mm. size and to re-treat the galena, blende and calamine middle products.

The jig treating the sand finer than 1 m.m. receives its material from a Ferraris hydraulic classifier; the other jigs receive their ore directly from the trommel. There are two classifiers on the pipe-line that carries the sand and slime to the jigs and tables. The first classifier feeds a jig and the second feeds two tables. At the end of the pipe-line the slime goes to a double pyramidal hopper which concentrates the slime and feeds two other tables. Not all four tables are generally fed with classified ore; when the feed is not sufficient for all the tables of one section, the idle tables are used to re-treat middlings.

The tables are exclusively of the Ferraris type, the construction and operation of which are very simple. The products are galena or lead carbonate and mixed lead and zinc middlings. The table makes 360 strokes of 14-mm. length per minute. Each table requires ½ h.p., and uses ¾ liter of water per second. The table makes a very rich concentrate and serves also to re-treat the middle products of the fine jig; one or two of the four tables in each section are reserved for this last purpose.

The same kinds of apparatus are used in the auxiliary washery, the total machinery of the whole mill comprising: Three crushers, 6 ball mills, 6 hexagonal classifiers, 1 wood and scrap separator, 26 Harz jigs, and 35 Ferraris tables.

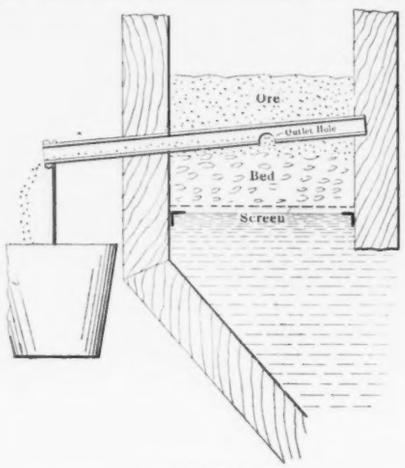
The total amount of water required is 47 liters per second, and the energy for driving the mill is 140 h.p. The power is generated by a Tasi-Sultzer engine, supplied by two Cornouaille boilers, the fuel being wood cut in the neighborhood.




FLOW-SHEET OF CONCENTRATING WORKS AT ROSAS

### Efficiency of Operation

The concentration of the sulphide ores is so much easier than that of the oxidized that richer concentrates and a higher efficiency are secured with the former class of ores. The galena concentrate contains 70 to 72 per cent. lead and 700 to 750 grams of silver per ton. The blende concentrate carries 42 to 45 per cent. zinc, and 5 to 6 per cent. lead. The sand tailings carry 3 per cent. zinc and only traces of lead. The waste slimes contain 8 or 9 per cent. zinc and 3 or 4 per cent. lead, but their quantity is small,




JIG DISCHARGE

or only about one-seventh of the ore treated. During 1907 the recovery of zinc averaged 71 per cent., and of lead, 74 per cent., but counting the lead in the blende concentrate, the loss of lead was only 6 or 7 per cent.

With the oxidized ores the presence of silicates derived from the diabase makes it hard to produce a rich calamine concentrate, so that we have to be satisfied with 30 per cent. zinc in this product; it invariably carries also about 12 per cent. of lead. On the other hand, the concentrated lead carbonate is quite rich, carrying 52 to 54 per cent. lead and 400 to 430 grams of silver per ton. The tailings have 7 per cent. zinc and 2 per cent. lead, while the slimes carry 10 per cent. zinc and 7 per cent. lead. The quantity of slime from these ores is considerably greater than that produced in the treatment of the sulphide ores, its exact amount depending upon the nature of the ore. The recovery from oxidized ores during 1907 averaged 49 per cent. in zinc and 63 per cent. in lead.

### Cost of Treatment

The expenses of the mill for the first

11 months of 1907 were: 56,945 fr. for labor, 25,286 fr. for materials, and 33,825 fr. for power. During this period, 19,355 tons of crude ore was treated, yielding 5820 tons of concentrates. The cost amounted thus to 6 fr. per ton, of crude ore, and 19.94 fr. per ton of concentrate.

The average daily expense of each section of the mill comprised 33.90 fr. for labor, 15.05 fr. for materials, and 20.14 fr. for power.

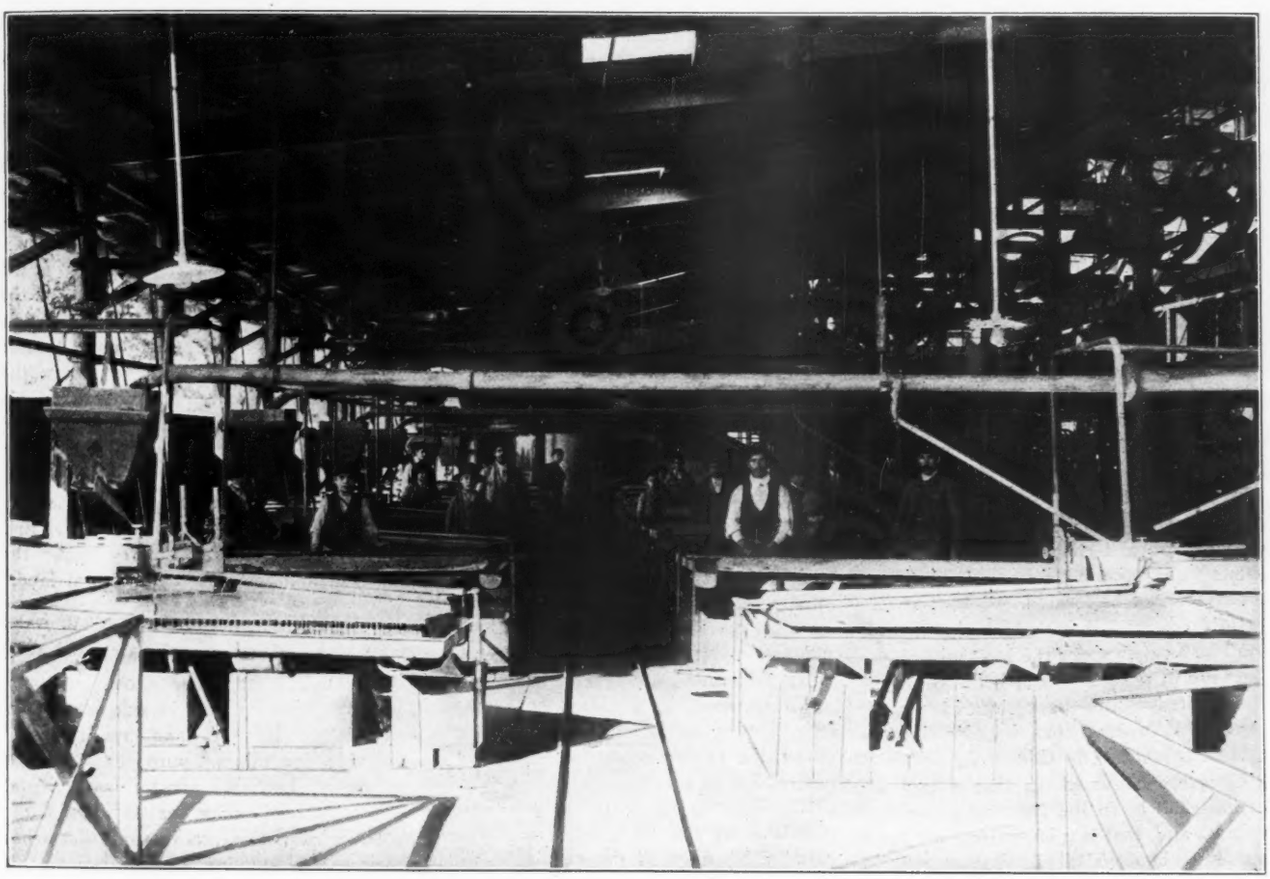
The accompanying illustrations give a general section and plan of the principal plant, an enlarged plan of one section, a drawing of the jig discharge, photographs of the exterior and interior of the works.

## Greene Consolidated Copper Company

The fiscal year having been changed to end with the calendar year, instead of July 31, the present report is for the 17 months ending Dec. 31, 1907. In this period 1,347,054 wet tons of ore and matte were treated, resulting in a production of 60,287,121 lb. bullion containing 58,180,856 lb. refined copper, 766,422 oz. silver and 6100 oz. gold. The recovery per ton from domestic ore was 46.58 lb. copper, or 2.329 per cent., and the value of gold and silver was $734,024, or $24.266 per ton of refined copper produced. Of the total bullion product given above, 54,574,551 lb. were from domestic ore and 5,712,570 lb. were from custom material.

The earnings were: Receipts from copper, gold and silver, $11,360,387; from sale of 200,000 shares Cananea Central Copper Company's stock, $2,000,000; from sale of 76,500 shares of Sierra Madre Lumber Company's stock, $1,350,000; sale of interest in Abundancia claim, $2500; interest on deposits, $26,017; total, $14,738,903. The expenses were: Copper, gold and silver account, $11,040,420; sundry expenditures charged to profit and loss, $478,237; total, $11,518,656. The net profit for the 17 months was, therefore, $3,220,247. The assets in excess of liabilities of the Cananea Consolidated Copper Company were stated to be $5,961,059. The average price received for refined copper, delivered, was 18.588c. per lb. Development during 17 months amounted to 2719.5 ft. of shafts; 13,592 ft. of winzes and raises; 48,519.5 ft. of tunnels, drifts and crosscuts; 2332 ft. of diamond-drill holes; total, 67,130 ft.

The Cananea Consolidated Copper Company sold 200,000 shares of the Cananea Central Copper Company for $4,000,000 cash, which returned a profit to the Greene company of $3,990,549. Of this amount, $1,990,549 was taken into the profit and loss account of the previous year. The Greene company sold its holdings in the Sierra Madre Lumber Company, amounting to 51 per cent., for $2,000,000, on deferred payments, secured by 75 per cent. of the lumber company's stock. Payments were defaulted upon and the directors are considering the disposal of 75 per cent. of the lumber company's stock. The lumber company repaid in cash $1,000,000 on previous advances and also paid off notes amounting to $150,000 which had been guaranteed by the Greene company. The contract for 1,000,000 ft. of lumber per annum, which formerly existed, was cancelled and a new contract was made which obligates the lumber company to supply sufficient lumber at the market price.



INTERIOR OF CONCENTRATING WORKS AT ROSAS

## Turks Islands Salt Industry

Consul J. A. Howells reports a considerable movement of salt from Turks islands in the West Indies. Several vessels have been taking cargoes to the United States and Nova Scotia. The f.o.b. price for several months has been less than 5c. per bu. for coarse salt, and 1c. more for ground salt, but a movement has been on foot to put the price up to 6c. for the former. The season of 1907 was very favorable for the salt rakers. One firm on Salt Cay broke the record by gathering over 290,000 bu. There were still about 1,500,000 bu. on the ground and in various salt houses the third week in January.

# Short Talks on Mining Law—I

By A. H. Ricketts*

The first mining act, that of 1866, passed by the Congress of the United States was silent as to placer claims. This omission was remedied by subsequent legislation (1870). The present mining act, the statute of 1872, provides for both lode and placer locations, defines the character of the deposit, which may be located in each class, declares what surface and sub-surface rights shall attach thereto, and the form of surface location each may have. It omits to state what shall constitute a "discovery" or what may be a sufficient marking of the claim.

This act applies to only certain portions of the United States that are public land; and in some of those States there is no statutory distinction between mineral and non-mineral land, and all public land therein may be acquired under the general land laws. Where the mining law is applicable it is not the geological form of the deposit which governs the mode of selection so much as whether under the terms of the law it is subject to location as a lode or placer claim, or, for that matter, subject to location at all. For instance cinnabar, which does not usually occur as a lode, must be located as a lode claim; and marble, although occurring as strata in solid rock, must be located as a placer claim. Iron and coal, if lying within the limits of certain congressional land grants, cannot be located.

It is essential that the mineral deposit shall be located under the laws applying to the kind of deposit to which the courts of the United States have decided that it belongs. An erroneous location in this particular confers no title.

Congress contemplates that a lode location shall be in the form of a parallelogram, and that a placer location upon surveyed lands shall be rectangular in form, or, more strictly speaking, be in conformity to legal subdivisions, but that is not essential to the validity of either. Yet, the extra lateral right does not attach to a lode claim with divergent end lines, and if a placer location upon surveyed land does not conform to legal subdivisions, sufficient reason must be shown for its departure therefrom or the location is invalid.

### Lode and Placer Ground

Although by its terms the mining act would seem to have been broad enough to authorize the location of any mineral substance, not rock in place, as a placer claim, the courts and the land department so restricted its application that Congress has specially provided by act of August 4, 1902, and act of Feb. 11, 1897, respectively, that land chiefly valuable for building stone or for petroleum or other mineral oils may be located as placer claims. There is no particular signification to be attached to the use of the word "chiefly" in such acts, as no land is properly subject to mineral location unless the mineral occurring on it makes it more valuable for mining than for agricultural purposes. The term "agricultural" as used in this connection is generic and applies to any land which is non-mineral in character. In other words, land, which contains some mineral but not in sufficient quantity to pay to mine by ordinary methods is "agricultural" land.

There is no limit to the number of independent claims of either class which may be located by the same person or corporation or association of persons except in the case of land containing salt springs or other deposits of salt. Coal lands may be mined, but title thereto cannot be acquired under the general mining law of 1872 but should be patented under a special act. Tide lands, at least in Alaska may be mined but no title can be acquired thereto under any act. Location in either of the last two cases does not tend to divest the Government of the title. In the first of these, if followed by exploitation, it merely gives a preferential right of entry to a limited area. In the last case it serves to protect the miner from intrusion by other miners.

Whether lands are surveyed or not is immaterial for mineral can be located either on surveyed or unsurveyed land. Neither age nor the sex of the locator matters, except in the case of a coal entry. If such an entry is sought, the applicant must be at least 21 years of age. Under the decisions of the courts, citizenship to any extent in the locator is practically immaterial except in patent proceedings or upon direct proceedings instituted by the Government in that regard. The right of descent in an alien is governed by local legislation.

### What Constitutes a Discovery

The location must be based upon "discovery," but the courts almost uniformly hold that discovery after location will validate the claim in the absence of an intervening adverse-right, and that a person working in good faith to make a discovery shall be protected as against all except him, who makes peaceable entry thereon. Some courts hold that indications of mineral within the claim or in its immediate vicinity is a sufficient discovery, while others hold there must be an actual discovery within the boundaries of the location. The latter seems to be the correct rule as mere conjecture as to the presence of mineral does not seem to be sufficient under the terms of the mining act.

No arbitrary rule can be laid down as to what constitutes a sufficient marking of the claim; the mining act only states that the claim must be so marked that its boundaries can be readily traced, but many States have enacted local laws specifying how certain points in the claim must be marked. These State laws must be complied with as an essential act of location, but the question is not thereby determined that the requirements of the mining act, which of course is the paramount law, have been fulfilled. The sufficiency of the marking of the boundaries of the location is a question of fact in which the conformation of the ground and the character and extent of the markings are the controlling factors. Upon the proper marking of the ground depends the locator's right thereto.

The courts have established the principle that a valid location vests the title thereto in the locator thereof. This doctrine is subject to certain qualifications.

As a matter of fact, the title does not vest until patent actually issues; at the last moment, the commercial value of the deposit located may determine whether the title or fee shall pass to the locator or to one who may seek to secure the land as an "agricultural claimant." This condition arises from the fact that, while a location, regular in form, based upon a discovery therein, may be sufficient as against another mineral claimant, it may not be sufficient to withdraw the land embraced therein from entry under the general land laws as "agricultural land."

### Mineral Land and Agricultural Land

If someone claims the land as agricultural land, it must be shown that the land contains mineral in sufficient quantity to render the land available and valuable for mining purposes. It must be shown that, as a present fact, mineral of commercial value exists within the boundaries of the location; not that it has been a paying mine, or, theoretically, it may become such. The reason for this difference in the right to the location is that when a controversy arises between two claimants under the mining act, the question is confined to that of priority of location, but, when one claims under the mining act and the other under the laws pertaining to the taking up of agricultural land, the question involved is the nature of the land and whether it is better adapted to mining than to any other purpose.

There is no defined line of demarcation between mineral land and that which cannot be so classed, for Congress has provided no general scheme for classification, except in the case of lands lying within the limits of its grant to the Northern Pacific Railroad Company.

It is true that in all the "public-land States" the respective surveyors general

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classify in their reports all surveyed lands as "mineral" or "agricultural" as the facts may seem to warrant, but such return is not conclusive, although it may affect the burden of proof in contested cases. In all such cases, irrespective of any report of the Surveyor General of the State, the question of the character of the land is specially determined by the land department. The decision of the land department upon that subject, whether right or wrong, is final unless it is set aside by direct proceedings, or it is shown that the decision is tainted with fraud. In other words, the patent is the evidence of its judgment as to the character of the land, and the patent is not subject to collateral attack as the courts have no revisory power over the decisions of land department upon questions of fact.

### Land, Subject to Mineral Location

Only land belonging to the United States and not reserved from sale, that contains valuable deposits of minerals is subject to valid location. Such land may be appropriated either as a lode or as a placer claim, as the law may require. The mere existence of some mineral within a given tract does not render it mineral land. It is true that indications of mineral therein or in neighboring lands may, possibly, be sufficient to warrant a location, but no land can as a fact be "valuable mineral land" unless it contains some deposit of mineral in some form in quantity sufficient to justify expenditure in the effort to extract it. This question does not arise between adverse mineral claimants. They both claim the land for the same purpose.

Discovery and appropriation are the sources of the miner's title, and the requisite annual expenditure secures the claim against adverse mineral location until patent issues. But it may be shown, at the instance of an agricultural claimant, that the location is not "valuable mineral land." If no discovery of appreciable value has been made, and it does not appear that further expenditure would develop the presence of mineral, the land is not mineral land within the meaning of the laws of the United States, and is therefore subject to entry as "agricutural land." But it is not essential that the property in dispute be a "going concern."

The locator of land, which apparently is not of appreciable mineral value, is protected from all forcible, clandestine and surreptitious intrusion thereon during the time than he is in the actual physical possession of the claim seeking in good faith to develop mineral therein; but he is not protected from one who makes peaceable and open entry upon the land, or from one who makes entry thereof in the local land office under the general land laws.

The land office has no knowledge of the existence of an unpatented mining claim until it is officially surveyed in patent proceedings, or its existence is shown in contest proceedings between the two classes of claimants. No actual notice is required in land-office proceedings until after appearance is made therein. The published notice is deemed the equivalent of a summons in a judicial proceeding. If the defendant does not make due appearance thereunder, his rights are waived, the matter proceeds *ex parte,* and he is deprived of all remedies except those which a court of equity might allow to be urged against a judgment at law.

### The Time when Title Passes from the Government

Even after the courts have passed upon the "right of possession" in an "adverse-claim suit," and the successful party therein has filed, in the local land office, the judgment roll and other necessary papers therewith, has paid the Government for the land embraced in his claim, and has received a "certificate of purchase" or "final receipt," the latter may be cancelled and after due proceedings in the general land office his "vested right" may be restored to the public domain.

It is not until patent actually issues that the land department loses jurisdiction, for the "certificate of purchase" is not equivalent to the patent, except as to adverse claims and "assessment work."

It follows, therefore, that title to a location may be valid as against an adverse mineral claimant, and yet be defeated because the land within its boundaries is not chiefly valuable for its minerals.

## Centennial Copper Mining Company

During the year ending December 31, 1907, the Centennial Copper Mining Company hoisted 225,271 tons of ore, of which 200,040 tons were treated in the mill, producing 3,604,970 lb. of mineral, from which was obtained 2,373,572 lb. of refined copper. The percentage of mineral in the ore treated was 0.901 per cent.; the refined copper in the mineral was 65.842 per cent.; and the refined copper per ton of ore was 0.593 per cent.

During the year the development consisted of 334 ft. of shaft sinking; 261 ft. of raising; 8 ft. of forks; 3,579 ft. of drifts; total 4,182 ft. The total amount of openings for the year was 71 per cent. greater than for the year 1906. There was a falling off in refined copper content per ton of rock treated amounting to 1.72 lb. In the first half of the year the refined copper amounted to 11.54 lb per ton of rock, while for the last half of the year the amount was 12.14 lb., which indicates a slight improvement with depth. The new hoist in No. 2 shaft and the new compressor were both put in operation during the year. Retimbering the collar of No. 1 shaft, which was in bad repair, was started during the latter part of the year, and at the close of the year had not been completed.

The treasurer's report shows receipts for the year amounting to $673,851, to which was added a balance of $340,310, which was on hand at the first of the year. The disbursement during this period was $884,176, which included working expenses at the mine, $433,727; smelting, freight and marketing copper, $36,255; construction and equipment at the mines, $64,193; total working expenses, $534,176. The other disbursements were for the Arcadian Mill property, $300,000, and assessment on one-half the stamp mill property, $50,000. The balance at the close of the year was $129,985.

President H. F. Fay says in part: "The notes for $300,000, given in payment for the Arcadian mill property in January, 1904, were paid in January, 1907, and that account was closed. One-half of this property was sold to the Allouez Mining Company in January, 1907, and the mill is now operated by both companies under the name of the Lake Milling, Smelting and Refining Company.

"During the last part of 1907 and the first three months of 1908 the mine showed an improvement in copper, particularly in the lower levels going north. At these points and in the 30th level, north of No. 2 shaft, there appears to be a general change for the better.

"The assessment on the stock of the Lake Milling, Smelting and Refining Company was required for construction and equipment expenses in connection with enlarging the mill and the purchase of two additional compound steam heads. The stamping cost of the mill, with three heads in operation, was 20.839c. per ton, although in 1907 a stamping charge of 30c. per ton was made to provide funds for fuel, supplies, etc. In 1908 the stamping charge will be nearer the actual stamping cost."

The price received for refined copper during the year averaged 18.4639c. per lb.

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Most of the orebodies in southeastern Missouri occur at, or close to, the base of the limestone, and frequently in the transition rock between the underlying sandstone and the limestone. This makes the working depth from the surface vary from 150 to 250 ft. for the upper orebodies, to 300 to 500 ft. deep to the basal orebodies, according as erosion has removed the ore-bearing limestone. The thickness of the latter ranges from 400 to 500 feet.

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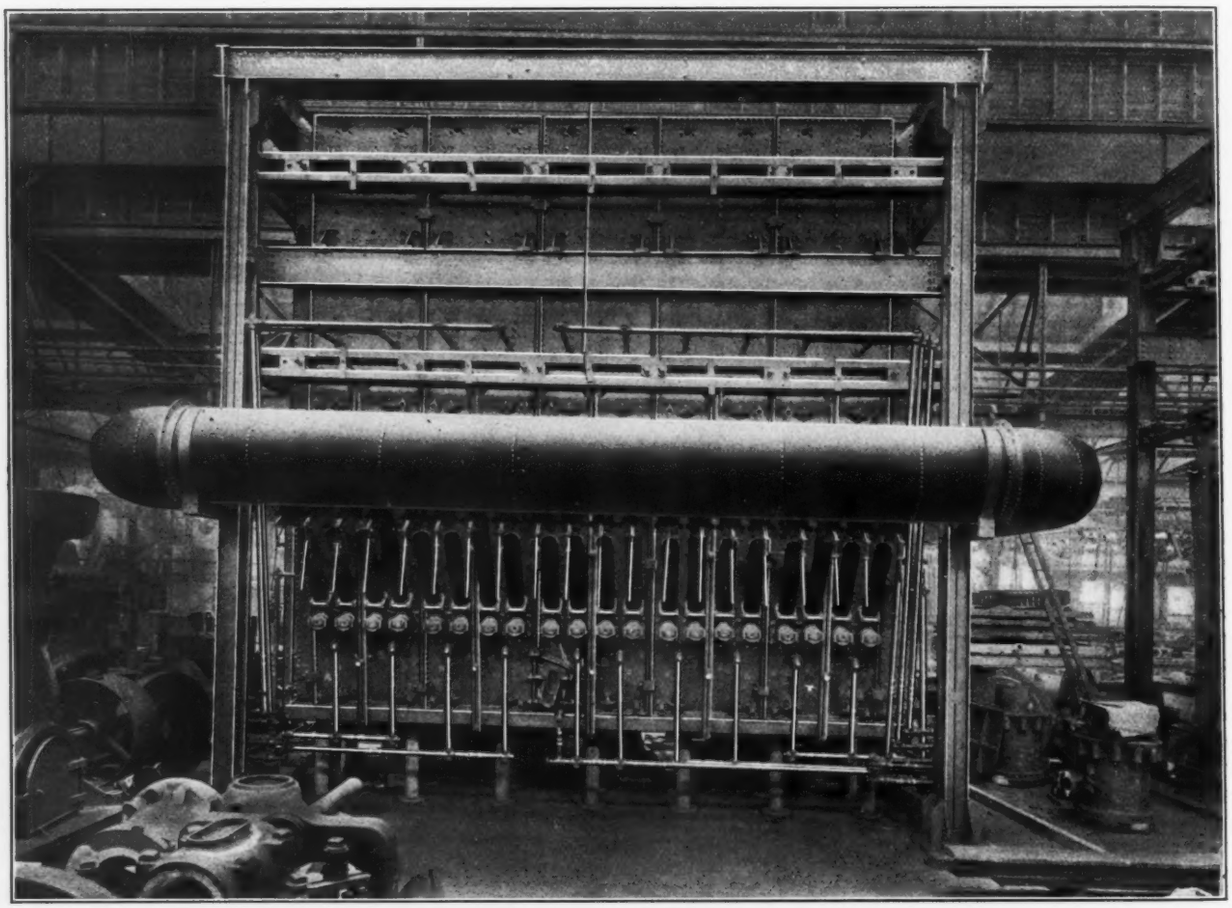
While cyanidation of silver ores is still in its infancy, it has already shown itself to be the best method for the treatment of certain low-grade silver ores.

# The Great Cobar Smelting Works

## An Important Copper-smelting Plant in Australia, Illustrating the Latest Practice, Designed and Partly Built in the United States

SPECIAL CORRESPONDENCE

The copper-smelting plant which is now being erected at Cobar, Australia, by the Great Cobar, Ltd., of London, England, for treating the ores from its mines, at that point, is of particular interest, inasmuch as it will be the most modern smelting plant in Australia, as well as one of the largest. In its construction and equipment, every point has been carefully worked out, to secure a plant of the highest commercial efficiency. The total capacity of the plant will be about 2000 tons of ore daily when all three furnaces are in operation; but it is intended at the present time to run only two furnaces at once, keeping the other furnace in reserve, so that a constant production can be maintained.



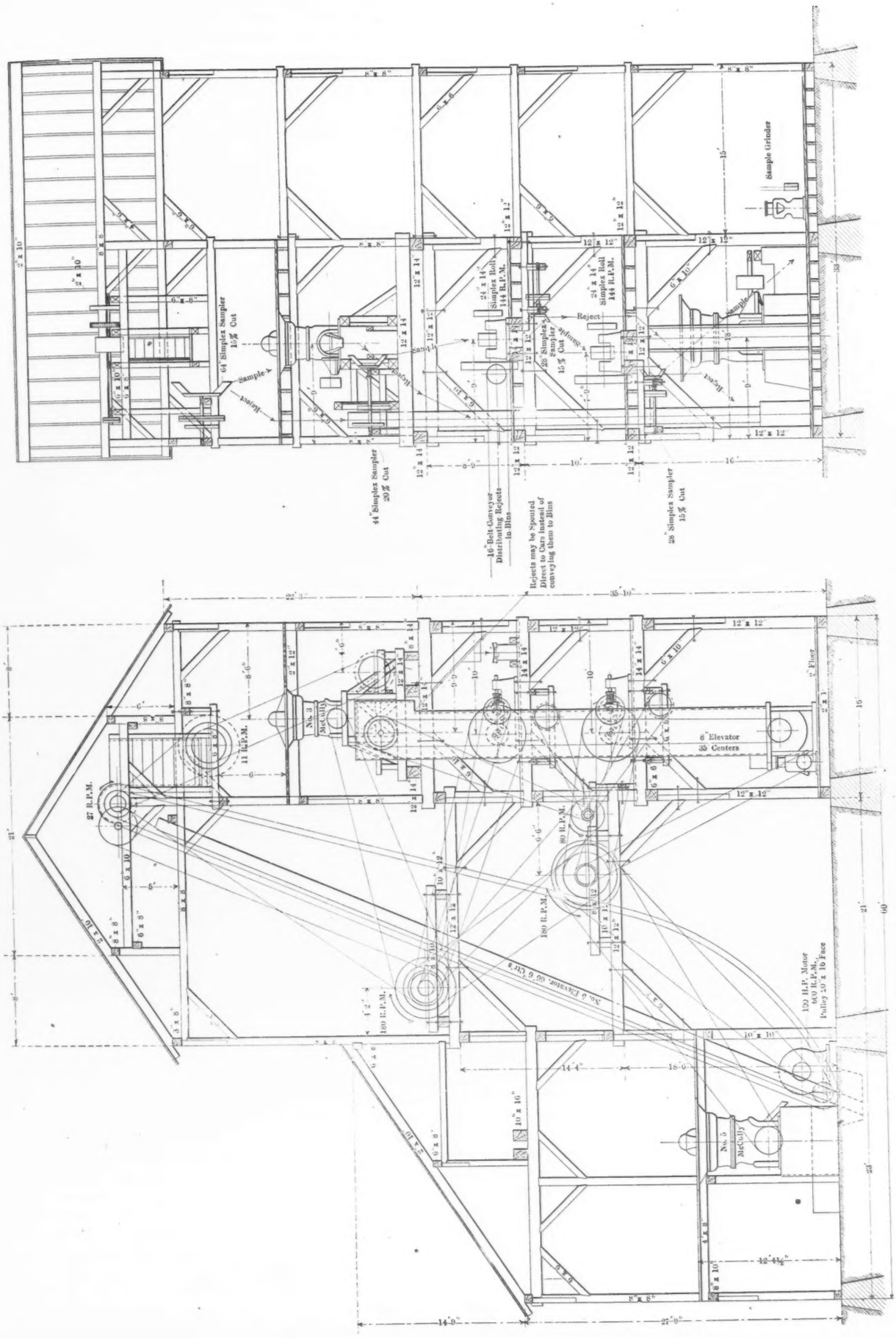
BLAST FURNACE, GREAT COBAR SMELTING WORKS

### Handling the Ore

The smelter will be a short distance from the mine, the ore being transported by hopper-bottom cars, running on standard-gage tracks and hauled by electric locomotives. The ore is raised from the mine through a double-compartment shaft in self-dumping vertical skips, which are handled by a direct-acting Corliss hoisting engine, receiving steam from the main boiler plant. The skips dump directly on a grizzly, the undersize material falling to a belt conveyer and the oversize going to a large Hadfield gyratory rock-breaker which reduces it to about 6 in. size. The product from this crusher joins the undersize from the grizzly at the belt conveyer, which transports and distributes the ore over a series of bins, from which it is loaded in railroad cars for transporting to the smelter.

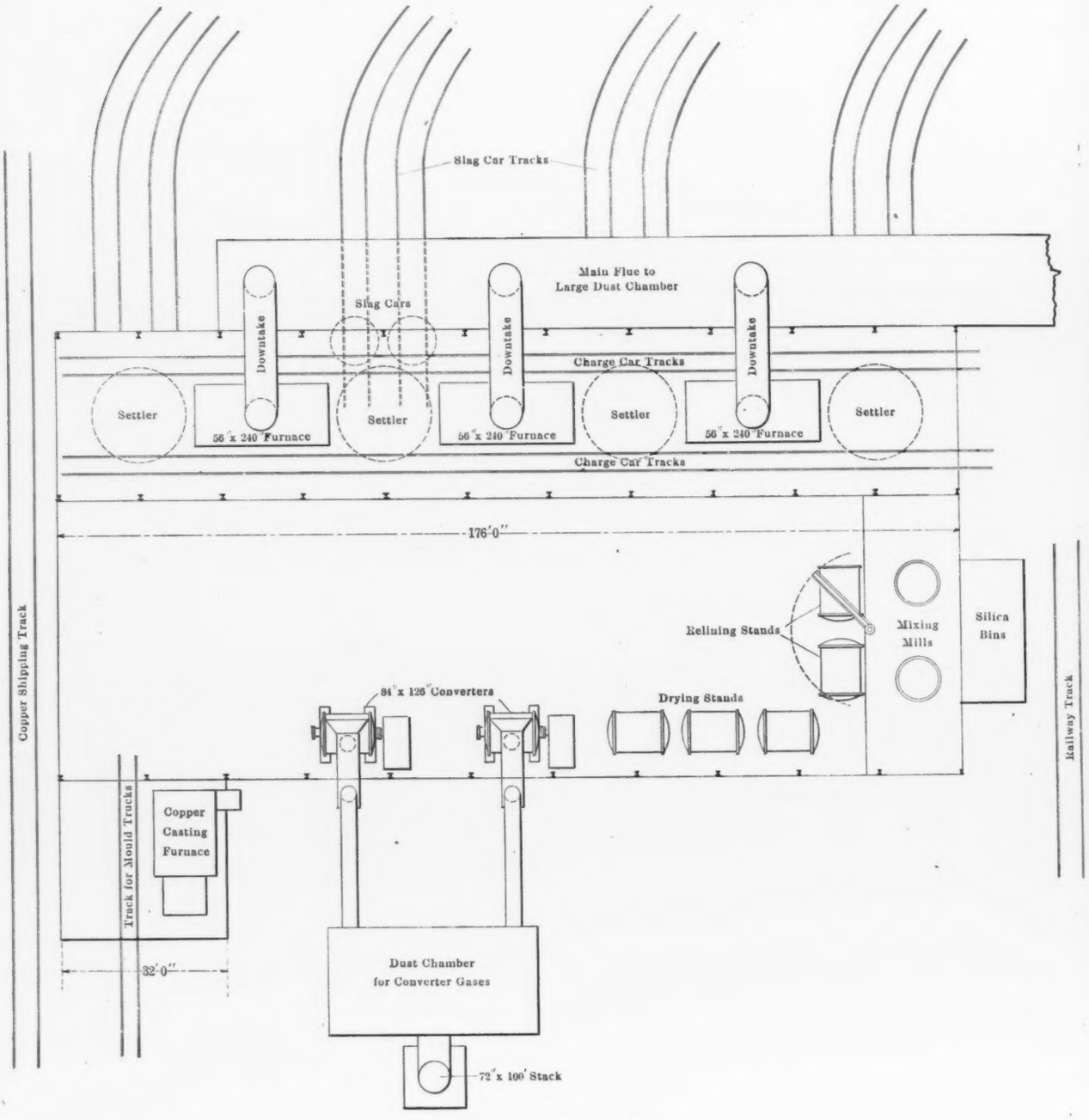
### The Sampling Plant

Placed between the mine and the smelter is a sampling plant having a capacity of about 50 tons per hour, in which every fifth car of ore coming from the mine, the high-grade silicious ores used for lining the converters and the fluxes will be sampled prior to being placed in the smelter bins. The equipment of this sampling plant includes a No. 5 gyratory crusher for preliminary crushing; a No. 5 stone elevator which raises material from the crusher to the first sampler; a No. 3 gyratory crusher for secondary crushing; two sets of 24x14-in. belt-driven rolls for subsequent crushing; a 64-in., a 42-in. and two 28-in. Simplex automatic samplers for sampling the ore in its passage through the mill. The final sample, consisting of 1-1500 part of the material passing the mill is discharged on the ground floor of the mill, where it will be further quartered by hand,


Sample Grinder
64" Simplex Sampler 15% Cut
Sample
Reject
24" x 14" Simplex Roll 144 R.P.M.
25" Simplex Sampler 15% Cut
44" Simplex Sampler 20% Cut
16" Belt Conveyor Distributing Rejects in Bins
Rejects may be Spouted Direct to Cars instead of conveying them to Bins
25" Simplex Sampler 15% Cut
No. 3 McCully
11 R.P.M.
8" Elevator 35 Centers
27 R.P.M.
80 R.P.M.
180 R.P.M.
No. 5 McCully
150 H.P. Motor 600 R.P.M. Pulley 20 x 10 Face

SAMPLING WORKS, GREAT COBAR SMELTING PLANT

and a final sample reduced in the sample grinder. The rejects from the mill are discharged on a belt conveyer, which transports and distributes them into a series of bins placed at one end of the mill, from which they are loaded in the railroad cars for transportation to the smelter. The mill is driven by a 100-h.p. induction motor, operating on 25-cycle, three-phase, 440-volt current supplied from the main power house.




PLAN OF FURNACE BUILDING

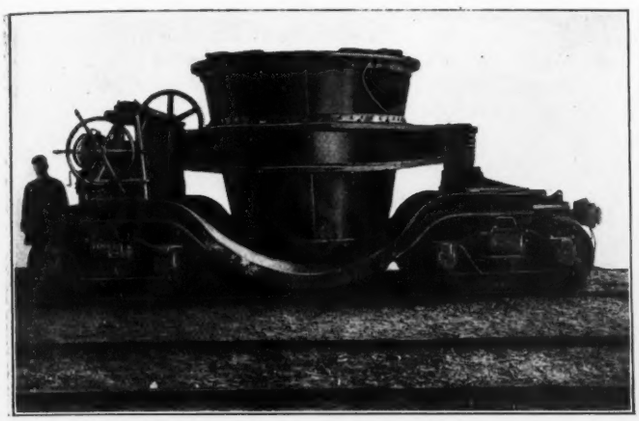
### The Blast Furnaces

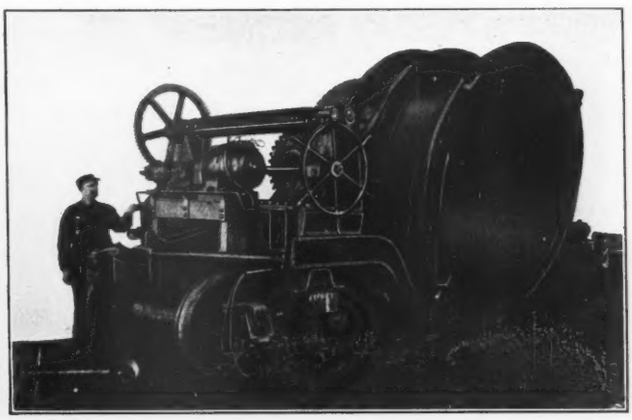
In the smelting plant there are three 56x240-in. blast furnaces, arranged end to end in the building; a round steel settler, 18 ft. in diameter and 4 ft. 6 in. deep being placed between each two furnaces and a similar sized settler at the outer ends of the two end furnaces. The furnaces are arranged to discharge at either end, so that there will always be available a spare settler in case of one of the settlers failing. In the future, the plant can be extended to any desired size and still preserve the same uniform and economical arrangement. The settlers and furnaces are mounted on a masonry pier, or foundation, running the full length of the building and 9 ft. in hight, in order to secure ample fall for the slag to the slag-pots and the matte to converter room, without using pits in the smelter floor, which, as everyone knows, are a source of much trouble and inconvenience.

The furnaces are of the modern high water-jacketed type, consisting of a heavy cast-iron bottom plate carried on cast-iron columns, upon which rest a set of steel jackets 10 ft. in hight. Above these lower jackets is a second set of jackets 10 ft. in hight, making a total of 20 ft. of jackets above the bottom plate. The upper jackets are supported independently of the lower jackets, and a particularly desirable feature in the construction of the furnace is that any jacket may be removed independently of any other jacket, and without disturbing either the binders or supports, or any of the water or the air piping for any other jacket. Each furnace has 40 tuyeres 5 in. in diameter, 20 tuyeres be-

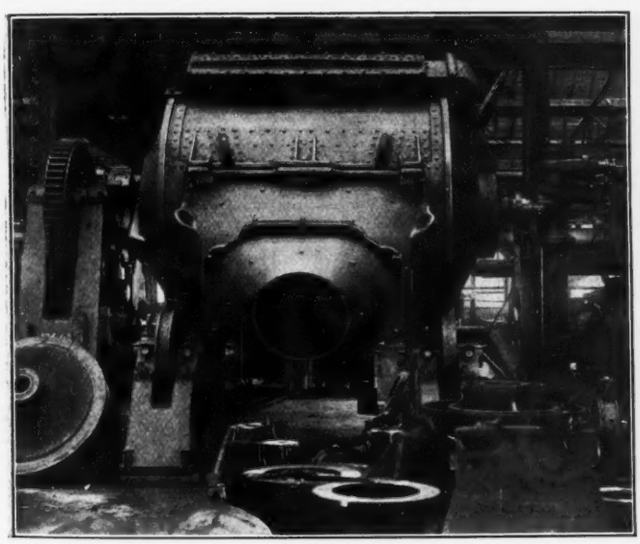
ing placed on each side of furnace about 12 in. apart, center to center.

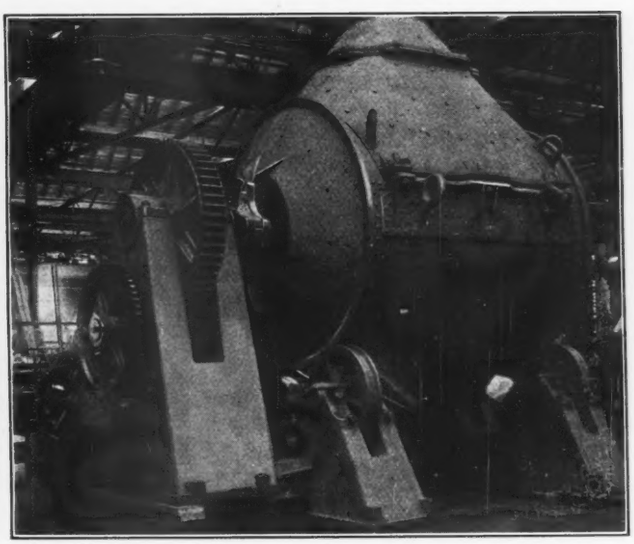
The mantle frame and superstructure of the furnace are carried upon steel columns, resting on foundations. The superstructure of the furnace resting upon the mantle frame is built of brick, strongly bound at corners and reinforced at sides by steel work. The charging openings at feed-floor are covered by steel doors, sliding vertically and operated by air cylinders receiving compressed air at 80 lb. pressure from the main power house. Leading from the top of the furnace is a steel downtake conducting the gases to a balloon-shaped brick flue, which runs alongside of the furnace building and conducts the gases to large brick settling chambers at one end of the plant. This flue is supported a sufficient hight above ground to permit the slag cars and electric locomotives to pass under it. The bottom of the flue is formed by a series of steel hoppers provided with draw-gates, from which the flue dust is drawn into steel cars, running on the slag car tracks, and transported to the briquetting plant.





25-TON SLAG POT FOR GREAT COBAR, LIMITED





TWO VIEWS OF CONVERTERS

The furnaces are charged by V-shaped side-dumping cars running on 36-in. gage tracks on either side of furnaces at charge floor level and handled by electric locomotives operating on 220-volt direct current. The furnace bins are arranged at one end of the smelter building, and each spout of these bins is provided with hopper scales which are set by the chemist's orders. In making up a charge, the train runs directly under the hoppers of these scales; the trainman merely pulls a rope which opens the gate in the bottom of the hopper as each hopper is reached, dropping the portion of charge contained in that hopper into the cars. There are thus no delays in the operation of the train for the weighing of charges, and the charges are absolutely uniform. All of the scale beams come on one floor on a level with the chutes of the ore-bins and one man is kept constantly employed walking from one scale to the next, opening the ore-bin chutes and allowing the ore to flow into the hoppers of the scales until the beam balances.

### Arrangement of Plants

The smelting and converting plant, as well as the power plant, are located on a practically level stretch of ground, thus permitting the slag-car tracks to approach the furnace at one side; while the converter plant is on the opposite side of the furnaces. The slag from the furnaces will be handled in pots holding 25 tons each, which are mounted on two four-wheel trucks, running on a 4-ft. 8½-in. gage track and hauled by electric locomotives, operating on 220-volt direct current. These pots are arranged with electric motors for dumping which are supplied with current from the electric locomotive of the train. In case of the current failing for any reason, however, the pots can be dumped by hand. Two slag-car tracks are provided for each settler, so that there is always an empty pot waiting at the settler to be filled, and the locomotive can pick up loaded pots for hauling to the slag dump and leave empty pots for filling at the settlers, as may best suit its convenience, without in any way interfering with the operation of the furnaces. It will also be noted that the arrangement of slag-car tracks is such that no matter to what extent the plant may be enlarged, no confusion of tracks will result; in other words, a uniform and

economical arrangement will always prevail.

The gage of all railway tracks about the plant is 4 ft. 8½ in. and all tracks are connected, so that a locomotive and train from any part of the plant can go to any other part. A siding is also run into the repair shops, so that locomotives and cars, as well as other machinery, can be readily transported there for repairing.

### Converter Plant

The converter plant is provided with two barrel-type converters 84 in. in diameter and 126 in. in length, which are electrically operated, 220-volt direct current being used by the motor. The converting plant is served by a 40-ton electric traveling crane, 50 ft. span, running the full length of building. The matte from the settlers is tapped into ladles holding 10 tons each, which are transported by the electric traveling crane and dumped into the converters. The copper from the converters is poured directly into similar ladles and taken to one end of the furnace building by the crane, where it is dumped into a reverberatory furnace holding about 15 tons of copper, in which the several charges from the converters are thoroughly mixed, brought to the proper temperature and then cast into anodes for the electrolytic refinery.

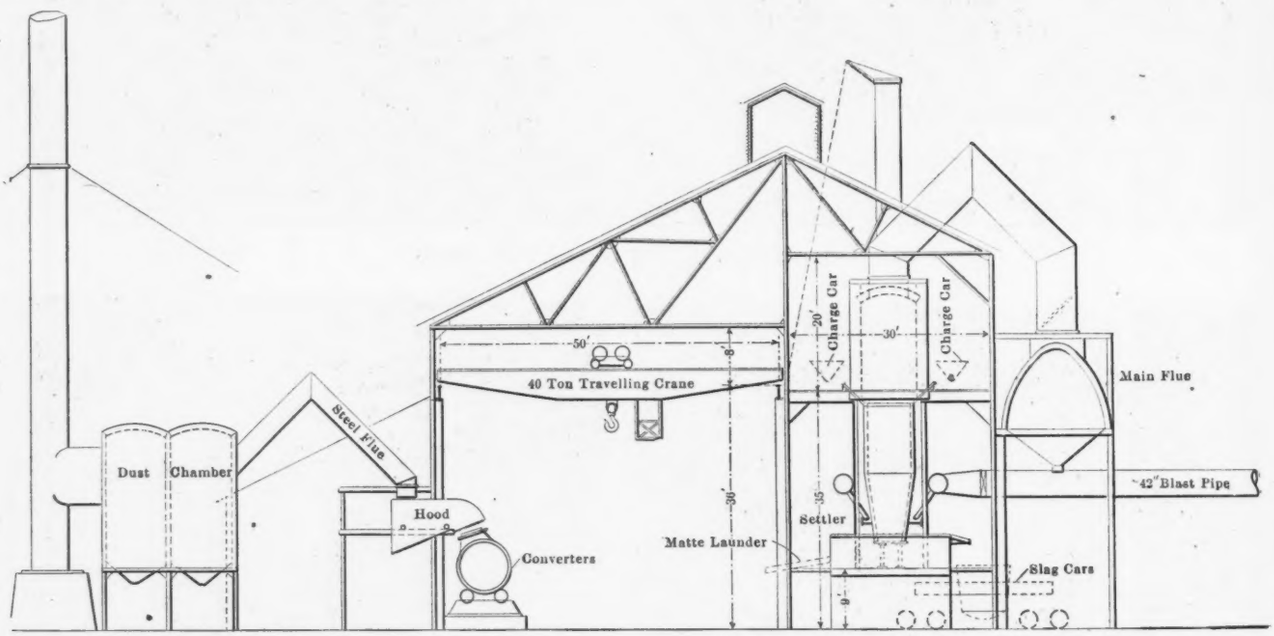
### Converter Linings

Silicious gold and silver ores are used for lining converters, these being sampled and crushed in the sampling plant mentioned above, transported by railway car to the converter plant and discharged into bins back of the mixing mills. The two 6-ft. mixing mills for preparing converter linings are placed at one end of the converter building, directly in front of the silica and clay bins. Each of these mills is belted to an independent induction motor of 35 h. p., operated by a current from the main power house.

The lining is tamped in the converter shells by a pneumatic tamping machine which is suspended from a jib crane over the relining floor, and is supplied with air at 80-lb. pressure from the main power house. It will be noted that an unusually large amount of space is provided in the converter room in which to clean out lining and dry the converter shells, so that the congestion prevailing in most converter plants, due to a lack of space for this purpose, will be entirely avoided. The gases from the converters are conducted by steel flues to a large stagnation chamber located at one side of the converter building. This chamber consists of a steel frame work provided with brick walls, laid in between the columns of the sides, and sheet steel hoppers in the bottom arranged a sufficient hight above the ground line to permit the cars and electric locomotive for transporting dust to the briquetting plant, to pass directly under the full length of the chamber. The chamber is covered on top with light sheet steel plates, to permit the radiation and dissipation of heat contained in the gases, so that as much as possible of the dust entrained in the gases will be deposited in the chamber. From this chamber the gases flow to a steel stack arranged at one side of the chamber and about 180 ft. in hight.

### Power Plant

The power house for the entire plant is arranged about 400 ft. to one side of the smelter building. In this plant there are provided three Connersville blowers, having a capacity of 300 cu. ft. each per revolution, and designed to operate under a maximum pressure of 60 oz. It is only intended, however, at the present time to operate under a pressure of from 42 to 48 oz. Each blower is connected independently with its own blast furnace by sheet-steel pipes; but a cross-connecting header with suitable valves is provided just outside of the power house, so that the blast from any blower can be directed to any furnace, or the pressure in all blast mains equalized. In case of the stopping of any blower, the remaining blowers can be connected to any furnace; or if it is desired to keep all three furnaces in operation at reduced capacity during the stoppage of one blower, the necessary valves in the header can be opened and the air from the blowers in operation distributed to the three furnaces.




SECTION OF FURNACE BUILDING

Each blower is directly connected to a tandem-compound condensing Corliss engine. It will be noted in the plan of the power house that the blowers and their engines are placed at an angle of about 45 deg. to the walls of the power house; by this arrangement a large saving in floor space is effected.

Air is supplied to the converters by a duplex blowing engine driven by cross-compound condensing Corliss engine. The capacity of this engine is 10,000 cu. ft. of air per minute compressed to 15 lb. terminal pressure. There are also located in the power house two pairs of air compressors driven by a cross-compound condensing Corliss engine, which have a capacity each of 2500 cu. ft. of air per minute compressed to a terminal pressure

of 80 lb. The air from these compressors is used for the operation of drills in the mine, air-hoists, etc., about plant. Electric power for the operation of all motors and electric locomotives about the plant, as well as for lighting the entire plant and mine, is supplied by three 300-kw. 50-cycle, three-phase, 440-volt alternating current generators, mounted directly upon the shafts of cross-compound condensing Corliss engines. But two of these units are required at a time, the other being always in reserve. So much of the plant is electrically driven that any failure in the source of electric current would necessi a general stoppage, which, of course, would be so expensive as to make it advisable to have a generating unit always in reserve. The switchboard controlling the entire power plant and the distribution of power to the various departments of the works, is placed adjacent to the generating units and parallel with the end-walls of the building.

The exciting current for the alternating current generators is supplied by a direct-current generator operated by a synchronous alternating-current motor, mounted on the same bed-plate, adjacent to the main engines. The motor of this unit receives its current from the main generator. For starting purposes and supplying exciting current in case of failure of the motor generator set, a steam-driven exciter set is provided alongside of the motor-driven exciter.

### Engines and Boilers

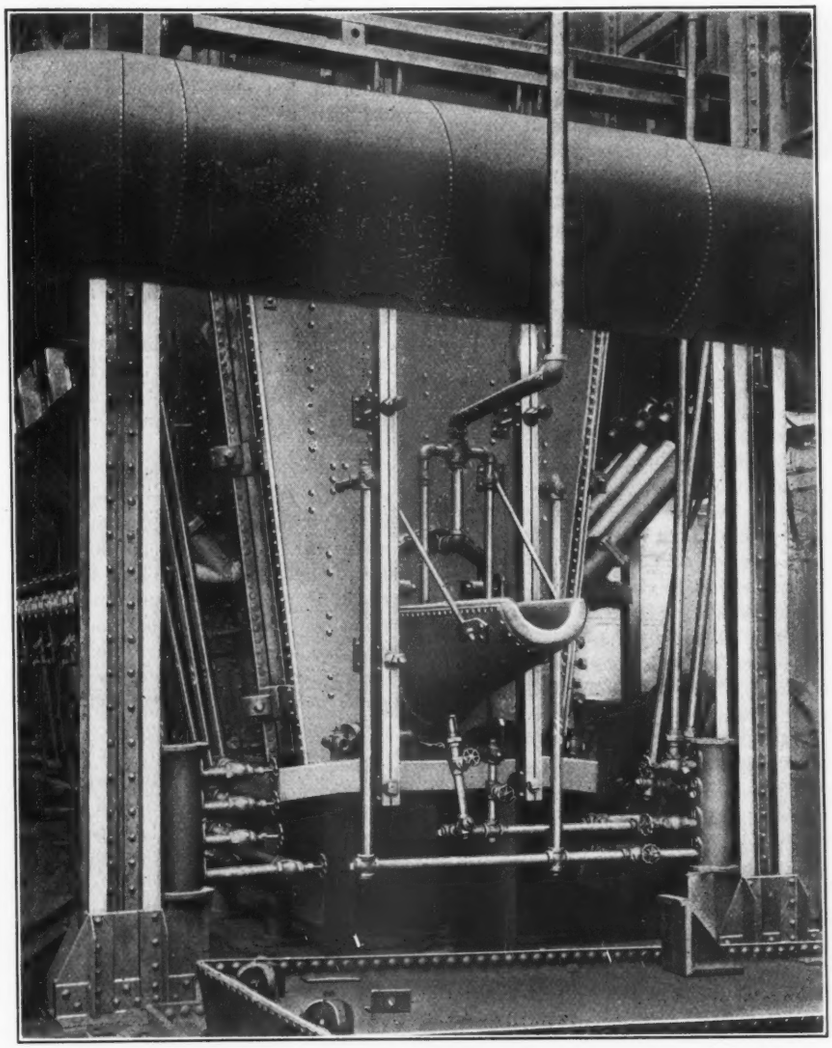
All engines operate under a steam pressure of 170 lb. at throttle, this steam carrying 75 deg. F. superheat, and being supplied by a battery of six 500-h.p. Babcock & Wilcox water-tube boilers, which are provided with self-contained superheaters, and are fired by chain-grate stokers. The coal for these stokers is supplied from steel bins overhead in the boiler room, in which it is deposited by a pan-type conveyer running the full length of the boiler room over the coal pockets and, outside of the boiler room, under a receiving hopper into which the coal is discharged from the railroad cars. The same conveyer on its return runs under the boiler room, and ashes from stoker are discharged into it. These ashes are conveyed and discharged into a steel hopper located over railroad tracks at one end of the building from which the ashes are taken by railroad cars. All engines will exhaust into a common exhaust main in which a vacuum of 26 in. is maintained by a barometric condenser, placed at one end of the building. The boiler feed is drawn from the condenser hot-well, and on its way to the boilers passes through Green economizers, arranged in the flue back of the boilers. By-pass flues are provided into economizer sets, so that any section of the economizer can be cut out for repairs or inspection without interrupting the operation of the plant. The gases after passing the economizers flow through a brick flue into the main power plant stack.

By reason of high steam pressure, superheat and vacuum, as well as the water-tube boilers, chain-grate stokers and economizers, exceptionally good economy will be realized in this plant, which is made necessary by the high price of fuel. The engine rooms are served by two 20-ton overhead hand traveling cranes, running the full length of the room. The power house building is of steel construction, the engine room being closed on all four sides by brick curtain walls, the boiler room being left open on all four sides, on account of the unusual climatic conditions prevailing in this section.

### Pumping Plant

The water will be pumped from the mines by multi-stage centrifugal pumps, operated by induction motors, which are arranged in duplicate so that in case of failure of one pump, the other can be put in operation. The condensing water and the water for water-jackets of furnaces, as well as that used for general purposes about the plant, are also pumped from the river a few hundred yards distant by centrifugal pumps driven by induction motors.

In the power plant a 250-kilowatt motor generator set, operated by a current from the main generators, supplies direct current at 240 volts for the operation of all motors about the plant as well as for the crane motors and the motors operating the converter stands.



BLAST FURNACE, END VIEW

### The Buildings

The smelting and converter plant buildings are of steel construction with corrugated iron roofs, but without side or end walls, except at the gables where they are closed in with corrugated iron to the hight of the lower chord of the trusses. This arrangement was adopted as the temperatures prevailing in this

section are unusually high at all seasons of the year, and all ventilation possible is desired. All bins about the plant are constructed of timber, and the sampling plant building will also be constructed of timber, as it is well away from the remainder of the plant and in no danger of fire. The shaft-house and headframe are of structural steel, the shaft-house being closed in on all four sides by brick curtain walls.

### Design and Construction

The designing of this plant was carried out by the company's consulting engineer in conference with J. C. Buckbee, president of the J. C. Buckbee Company, Engineers, Chicago. The machinery was secured in America and Great Britain. The furnaces and converters were built by the Power & Mining Machinery Company, of Cudahy, Wis.; the blowers by the Connersville Blower Company, Connersville, Ind.; the slag cars by the W. B. Pollock Company, of Youngstown, Ohio; the blower engines by Cole, Marchant & Morley, Ltd., of Bradford, England; blowing engines and air compressors by Walker Brothers Ltd., Wigan, England; the hoisting engine by Andrew Barclay Sons & Co., Ltd., Kilmarnock, Scotland; generator engines by Browett, Lindley & Co., Ltd., of Manchester, England; boilers, conveyers and 40-ton electric overhead crane by Babcock & Wilcox, Ltd., of Renfrew, Scotland; condensers by Ledward & Beckett, London, England; shaft-head-gear by Head, Wrightson & Co., Ltd., Thornaby-on-Tees, England; alternators, generators, motors, etc., by Siemens Brothers Dynamo Works, Ltd., of Stafford, England; electric locomotives by the British Westinghouse Company, of Manchester, England. The structural steel material for buildings was furnished by A. & J. Main & Co., Ltd., of Glasgow, Scotland.

The complete plant is expected to go into commission early in the current year.

## Electrochemical Analysis with Rotating Anodes

A. M. Fairlie and A. J. Bone (*Electrochem. and Met. Ind.*, VI, 19-21, 58-60) have described the equipment of rotating anodes for electrolytic-copper work at the laboratory of the Tennessee Copper Company. The apparatus consists of eight anode holders or spindles of steel which revolve in brass supports. At the top of each spindle is a double-grooved pulley 2 in. in diameter, driven by a round belt, connecting one pulley with another and with the motor pulley. At the lower end of the spindle is a chuck nut which holds the anode in place. The anode is a piece of hard platinum wire, 1.4 mm. in diameter and 108 mm. long, at the lower end of which is soldered a platinum propeller wheel, 31 mm. in diameter, with 10 blades set at 45 deg. pitch. The complete anode weighs 6 grams. The cathode is a platinum cylinder having 60 perforations of 4 mm. diameter distributed in four rows of 15 holes each. The cylinder is 52.5 mm. in diameter and weighs about 16 grams. An ordinary binding post holds the cathode, so that the anode revolves in its center. The anodes and cathodes are connected in series, with suitable switches to cut out any pair of electrodes as wanted, without interrupting the current in the others.

The current available for the electrolytic work is obtained from a 220-volt lighting circuit and is regulated by an electrolytic hot plate connected in series which acts as a rheostat; and when not available, a set of eight incandescent lights connected in parallel is used. With this arrangement any current strength from 0.25 amp. up, in steps of 0.25 amp. up to the highest amperage needed for the work may be obtained. As an auxiliary source of current, a set of storage batteries is installed; this is automatically cut in when the lighting circuit fails, and is cut out when the 220-volt current returns. The hot plate is also connected up to act as a rheostat when charging the storage batteries.

The determination of copper in comparatively pure material with rotating anodes does not require any other treatment than is usual with stationary electrodes. In a desire to apply rapid electrolysis to highly ferruginous material it was found, that in some cases after the deposition of the copper had been proceeding satisfactorily for some time, the deposition would suddenly cease and the deposited copper all redissolve. The authors concluded that the iron, which was at first reduced by the electrolytic action to the ferrous state was subsequently oxidized to the ferric condition, in which state its solvent action was stronger than the electrolytic action. The conditions which obviated this difficulty required an amount of nitric acid not more than 1 c.c. in 150 c.c. of electrolyte. It was also found that the presence of insoluble matter in the electrolyte did not interfere with the electrolytic action, but it was liable to deposit mechanically in the perforations of the cathode and thus interfere. The general manipulations are the same with rotating as with stationary anodes. The hydrogen-sulphide test is applied to a small portion of the electrolyte to determine the completeness of the deposition. The motor is stopped when removing the cathodes, and fresh wash water is provided for each cathode when removed.

### Methods

*Converter Bars*—Five grams are dissolved in a 250-c.c. beaker with 21 c.c. concentrated nitric acid; 5 c.c. concentrated sulphuric acid is added and the solution evaporated to dryness. The residue is taken up in 75 c.c. of water and 2.5 c.c. nitric acid, boiled, diluted to 150 c.c. and electrolized with these conditions: Initial temperature, 50-55 deg. C.; 5 amp. per 100 sq. cm. of submerged cathode area; time, two hours; revolutions per minute of anodes, 400 to 500.

*Mattes*—Treat 1 gram in a 250-c.c. beaker with 15 c.c. of a mixture of nitric acid and bromine (prepared by shaking 10 c.c. of bromine with half a liter of nitric acid), and allow to stand in the cold until the sulphur is oxidized, adding a few drops of bromine if necessary. Add 4 c.c. hydrochloric acid, boil gently to complete decomposition, and evaporate to fumes with 2 c.c. sulphuric acid. Cool, take up with 50 c.c. water, 2 c.c. sulphuric acid and 2 c.c. nitric acid. Boil to dissolve all soluble salts, dilute to 150 c.c. and electrolize. Initial temperature, 50 to 55 deg. C.; 3 amp. per 100 sq. cm. of submerged cathode area; time, 45 to 55 min.; revolutions per minute of anodes, 400 to 500.

*Ores*—Take 1 gram and heat gently with 10 c.c. of nitric acid until all red fumes are expelled, then evaporate to dryness with 1 c.c. sulphuric acid. Cool, take up with 50 c.c. water, add 3 c.c. sulphuric acid and 2 c.c. nitric acid, boil and filter into a 250-c.c. beaker. Dilute the filtrate to 150 c.c., and electrolize. Have the conditions as for mattes, except use a current strength of 2 amp., and time, 40 to 50 min.

*Slags*—Treat 3 grams in a 4-in. casserole with 15 c.c. hydrochloric acid, stir well, add 5 c.c. nitric acid, stir again, cover, and boil for 5 min. Remove from heat, slip back the cover a trifle and add 4 c.c. sulphuric acid. When the violent action has ceased, wash the cover and sides of the casserole, stir the mass well, and evaporate to dense white fumes. Cool, take up with 30 c.c. cold water, add 1 c.c. nitric acid accurately from a burette, boil well, filter, using suction, and wash thoroughly. Transfer the filtrate to a 250-c.c. beaker, dilute, if necessary, to 150 c.c., and electrolize. Conditions as above except 3 amp. and 35 to 40 min.

The methods here given apply only to materials free from interfering elements; these when present require modifications.

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Steel or iron pipe, placed in soils containing small amounts of common salt, sodium carbonate, or a mixture of magnesium chloride and sodium nitrate, according to experiments made by the Geological Survey Office, Perth, West Australia, rusts twice as fast as when it is immersed in water containing a little oxygen and carbon dioxide. The presence of calcium carbonate, chloride, or sulphate, magnesium sulphate, or nitrate, increases the rapidity of this corrosion considerably. In these experiments, soft iron was found to resist the corrosion slightly better than ordinary steel.

## Sorting Ore at the New Kleinfontein Mill, Transvaal, South Africa

By Edward J. Way*

At the new Kleinfontein mill, Transvaal, South Africa, the ore from the shaft bins is taken by the conveyers to the sorting and crushing house, where the ore is first dumped on the main trommel. This main trommel, 18 ft. long and 5 ft. in diameter, is inclined at an angle of 10 deg. and runs at 10 r.p.m., driven through a chain and sprocket-wheel drive and spur-gearing by the 50-h.p. motor driving the conveyer carrying the ore to the crusher station. The upper half of the trommel acts as a screen and removes about 40 per cent. of the total ore brought to the crusher station, or an average of 704 tons per day, which falls as "fines" direct into the No. 1 "fines" bin; while the lower half acts as a washer, and, by removing dust and dirt from the remaining 60 per cent. of rock, facilitates its sorting on the sorting bins. The cleansed rock passes direct to two revolving screens, where it is separated into two sizes, all under 3-in. cubes. About 40 per cent. of the total passes as "intermediates" direct to the two "intermediates" sorting belts, and the remaining 60 per cent. passes direct to the two "coarse" sorting belts. On the "coarse" belts about 40 per cent. of the rock is sorted out as waste, while the remainder, falling over the head ends of the belts into chutes, is delivered directly to the "coarse" crushers and is broken into 3-in. cubes, which drop onto grizzly bars spaced 1 in. apart. About 10 per cent. of the broken rock falls between the bars into the No. 2 "fines" bin, and the remaining 90 per cent. is conveyed as "return intermediates" by the "return intermediates" belt to the "return intermediates" trommel. This trommel acts simply as a washer, and, after cleaning the "return intermediates" from dust and dirt, discharges them to join the "intermediates," separated by the two revolving screens previously mentioned. There they undergo a second sorting in which the 20 per cent. of waste still left in the "return intermediates" is picked out, bringing up the total waste-rock removed from the "coarse" to 50 per cent., while at the same time an average of 50 per cent. of waste is sorted out from the "intermediates." The ore remaining on the "intermediates" belts passes direct to the "intermediates" crushers, where it is broken into 1-in. cubes and is deposited in the No. 2 "fines" bin. The total waste-rock sorted out averages 50 per cent. of the ore sent to the sorting belts or 30 per cent. of the total ore mined.

The "coarse" and "intermediates" sorting conveyers proceed, at an inclination of 16 deg., from the chutes which catch the "coarse" and "intermediates" separated by the revolving screens, and which feed them on their respective sorting belts, up to the sorting floors situated above the waste-rock bins, and pass at an angle of 10 deg. over these floors to their head ends, where they discharge the sorted ore into the chutes leading to the crushing plant. All four conveyers are Robins belts, 36 in. wide, and each is driven at a normal speed of 50 ft. per min. by a 7½-h.p. motor, geared to its head pulley. The two "coarse" belts are 86 ft. 6 in. long between pulley centers, and each has a capacity of 58 tons per hour, while the two "intermediates" belts are 98 ft. 5 in. long between pulley centers, and each has a capacity of 61 tons per hour.

The "return intermediates" conveyer, a Robins belt 18 in. wide and 79 ft. 2 in. long between pulley centers, runs upward between the waste-rock bins at an angle of 21½ deg., and extends from the grizzlies below the "coarse" crushers up to the "return intermediates" trommel. It is driven at its head end by a 15-h.p. motor at a speed of 300 ft. per min., and has a carrying capacity of 50 tons per hour. This angle of 21½ deg. appears to the author to be the critical angle for conveyers of this type handling rock of this size.

The average tonnage handled per day by the various belts is as follows: 317 tons by each "coarse" belt, 382 tons by each "intermediates" belt, and 342 tons by the "return intermediates" belt; while an average of 528 tons of "fines" is deposited in the No. 2 "fines" bin, which, with the 704 tons screened out by the main trommel and deposited in the No. 1 "fines" bin, brings the average daily tonnage crushed and concentrated in the crusher station ready for conveying to the mill bins up to 1232 tons.

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Note—Abstract from an article, entitled, "Labor-saving Appliances at the Mines of the New Kleinfontein Company, Transvaal," read before the Institution of Mechanical Engineers, Nov. 15, 1907.

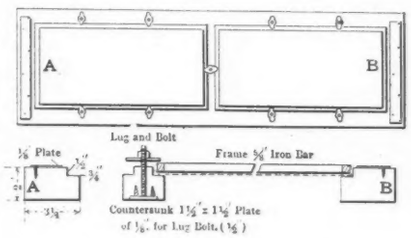
## A Modified Battery Frame

A modification of the normal type of battery frame is described by G. E. Williams, (*Journ. of the Chem., Met. and Min. Soc. of South Africa,* Jan., 1908).

The frame is made of 2-in. pine and the edges of the screen panels are rabbeted out, ½ in. deep and ¾ in. wide. In this recess an iron frame, constructed of ⅝-in. sq. rod, fits loosely. Five lugs or buttons keep each frame in position. These lugs are held down by ½-in. bolts, the ends of which are riveted through 1½x1½-in. squares of ⅛-in. plate. This plate is countersunk and held in place by screws as shown in Fig. 1.

The screens are bent on a bench. A block of hardwood, the size of the outer portion of the frame, is fastened to the bench and an iron frame fits loosely over this. The screen is placed on the block, the frame hammered over it and the edges trimmed off.

When a screen in the battery breaks, the lugs are loosened and the iron frame removed. One of the new screens is then put in place, the iron frame replaced and




PLAN AND DETAILS OF BATTERY SCREEN FRAME

the lug screws tightened. The whole operation occupies only a few minutes. When but one panel breaks, only the broken panel is removed. A certain saving in the screens is thus effected.

The value of this device is much enhanced when inside amalgamation is used. Changing the panels does not affect the sands which tend to bank up against the lower edge of the screen.

## Dust Collector for Rock Drills

At a recent session of the Société de l'Industrié Minérale, M. Reumaux gave a number of suggestions as to the use of rock drills, and, among other novelties, described an easily made apparatus for catching the dust as it comes from the drill hole, thus avoiding the use of a hollow drill with spray of water. He objects to the latter method of preventing contamination of the air because the mud and the dampness are almost as disagreeable as the dust would be.

His apparatus consists of a conical wire frame, which can be made of 3-mm. steel wire, by coiling it on a wooden mandrel; the resulting coil is covered with flexible leather. The small end of the cone is fastened to the forward part of the drill cylinder. The large end has a heavy leather washer, and a tight contact between the washer and the rock wall is made with clay. The air escaping around the drill piston is sufficient to carry the dust off through the discharge at the back end of the cone, leading into a pail of water.

The dust collector has a length of 75 cm. and a diameter of 5.5 cm. at the small end and 10 cm. at the large end. Only this one size is required, for a bit will usually get dull, and will be replaced by a longer bit after every advance of 50 cm., which is within the range of elasticity of the dust collector.

## Delaware & Hudson Company

This company owns a large coal estate in the anthracite region of Pennsylvania; and it also operates an extensive system of railroad lines, running from that region to northern New York, Vermont and Canada. Unlike most of the anthracite carrying companies, it works its coal estate directly, and not through a subsidiary company. The report is for the year 1907.

The coal statement for the year is as follows:

| | 1906. | 1907. | Changes |
|---|---|---|---|
| Coal on hand Jan. 1. | 113,061 | 141,645 | I. 28,584 |
| Coal mined..... | 5,401,389 | 6,623,508 | I. 1,222,119 |
| Coal bought..... | 268,985 | 382,478 | I. 113,493 |
| Total..... | 5,783,435 | 7,147,631 | I. 1,364,196 |
| Coal sold..... | 5,641,790 | 6,772,647 | I. 1,130,857 |
| On hand Dec. 31... | 141,645 | 374,984 | I. 233,339 |

The total anthracite coal carried by the company's railroads was 8,690,356 tons in 1906, and 10,025,312 tons in 1907; an increase of 1,334,956 tons. Other mineral freights carried in 1907 were 2,270,328 tons bituminous coal; 159,633 tons coke; 829,636 tons ores; 827,505 tons stone, sand, etc. Mineral freights were 68.4 per cent. of the total tonnage carried. The transportation of coal furnished 54.6 per cent. of the railroad earnings.

The coal department's financial statement is as follows:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Earnings..... | $18,571,342 | $23,184,766 | I. $4,613,424 |
| Expenses..... | 17,521,844 | 22,227,284 | I. 4,705,440 |
| Net earnings.. | $ 1,049,498 | $ 957,482 | D. $ 92,016 |

Expenses include taxes and the cost of coal added to stock. The expenses for 1907 also include construction and betterments amounting to $723,552. They also include $200,000 debentures of the Hudson Coal Company retired during the year under the provisions of their issue. The earnings were $3.42 and the expenses $3.28 per ton of coal sold. The expenses are not given in detail in this report, as they have been in former reports. In 1906 the cost of coal marketed was: Mining and preparing, $2.12; transportation, $1.05; selling and general expenses, $0.09; total, $3.26 per ton.

The report says: "The collieries and washeries of the company were operated to their full capacity throughout the year, producing 6,623,508 tons of anthracite coal out of a total of 67,109,393 produced in the region. At the close of the year there were in the several storage plants 374,984 tons. The coal production of the company has in the past been greatly hampered by an insufficient supply of railroad cars. This condition has been overcome by the purchase of new coal-car equipment."

### Coal Land Purchases

The report says: "It has been the policy of the company for many years past to acquire additional coal lands as opportunity afforded. As the result of a careful examination of the coal lands owned and controlled by the company in 1898, the estimated minable tonnage at that time was placed at 250,000,000 tons. Some small purchases were subsequently made, and the total estimated tonnage controlled by the company on Dec. 31, 1904, was 218,644,286.

"So far as the company could ascertain, there were no tracts of anthracite coal lands in the Lackawanna and Wyoming valleys of sufficient size to permit of profitable mining which were not already owned or controlled by other coal producers. The only tracts of anthracite coal lands which were of sufficient magnitude to permit of successful mining operations, and which could be purchased at reasonable prices, were found in Schuylkill county, Penn., and after careful examination, nine tracts were acquired. Although some parties who had endeavored to mine coal on two or three of the properties were not successful in their efforts, it was the opinion of expert mining men that their failure was due to lack of capital, and, further, due to the fact that they operated slope mines and worked only one of the veins of coal. Since then, other parties have expended sufficient sums to install a modern development in this field operating shaft mines, with the result that their investment has proven a profitable one.

"It was quite possible that the amount of unmined coal owned and controlled by the company Dec. 31, 1904, might be exhausted in less than 25 years, after which the company could no longer have accomplished the purpose of its incorporation in 'opening and of mining, and of bringing to market a supply of stone coal.' The possession of an adequate reserve, moreover, justifies the company in stimulating an increase in its output and enabling it to better supply the territory served by it. The attention of the company had been repeatedly called to various tracts of anthracite coal lands in Schuylkill county, and as early as the year 1901 it secured reports from mining experts thereon. In the summer of 1905, a careful examination was made of various parcels of anthracite coal lands, including among others the tracts known as the Albright, Thuron, Ronaldson, Navigation, Chamberlain, Schall & Bannan, Sheafer, Spayd, and the Eckel & Spangler, and also tracts known as the Holyoke, Bickel, Schall & Repplier, Pott & Bannan, Keffer, Bannan, Miller, Bories, and others.

"Besides examining these tracts upon the ground, by means of the outcrops, the openings and slopes thereon, the geologist thoroughly studied the geological coal surveys of the State of Pennsylvania so far as they affected the said properties. He also had access to and consulted reports on the several properties made by various mining engineers who had previously examined the same. The attorneys of the company carefully inquired into the titles.

As a result of such examinations, the following selected tracts were acquired in the interest of the Hudson Coal Company, all the stock of which is owned by the Delaware & Hudson Company: The Albright, Thuron, Navigation, Chamberlain, Ronaldson, Schall & Bannan, Sheafer, Spayd and the Eckel & Spangler. These tracts cover 2434 acres of surface and 3461 acres of coal land; the coal rights on some of the tracts extending beyond the surface area, by agreement with adjoining property owners. The estimated gross tonnage in the coal areas is 650,584,136, an average of 187,975 tons per acre; the estimated minable coal is 423,265,353 tons, or 65.2 per cent. of the gross tonnage.

"The total consideration paid for the above named properties was $5,219,850, being 0.8c. per ton on the estimated gross tonnage, and 1.23c. per ton on the estimated tons of minable coal. The titles to these properties were taken in the name of two Pennsylvania mining companies, namely, the Schuylkill Coal and Iron Company and the Shanferoke Coal Company, all the stock of each of these companies being owned by the Hudson Coal Company. The Schall & Bannan and the Sheafer tracts are held by the Shanferoke Coal Company, while all the others tracts are held by the Schuylkill Coal and Iron Company."

## Chemists in Germany

According to T. H. Norton, U. S. Consul at Chemnitz, Germany's numerous and finely equipped departments of chemistry in both universities and polytechnics are sending forth annually a troop of young chemists far in excess of the actual needs of chemical manufacture or of the various industries requiring more or less of chemical analytical supervision. This "scientific proletariat" is numerically so large that current salary rates are forced down to figures absurdly out of proportion to the time and expense involved in securing an adequate training. Many emigrate, and the German chemist is now found in every land, but the surplus at home is far too large. The electrician, the various catagories of engineers, as well as the members of the older professions, and the business man can look forward in Germany to a far greater probability of satisfaction and reward for the possession of the homely virtues of perseverance and industry than is the case with the chemist.

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At Glendale, Mont., deposits of argentiferous galena, blende, copper and iron pyrites, and their oxidation products, lie parallel with the bedding planes of a blue-gray limestone.

# Montana-Tonopah Stamp and Cyanide Mill

## The Crushed Ore Is Concentrated on Wilfley Tables and Vanners and the Slimes Are Treated in Hendryx Cyanide Agitators

SPECIAL CORRESPONDENCE

Within the past few months the Montana Tonopah Mining Company has finished a new 40-stamp mill, under the supervision of F. L. Bosqui, of San Francisco, the well known metallurgist. This mill, which is one of the most modern in the country, was equipped by the Allis-Chalmers Company. It comprises a battery of 40 stamps, with a capacity of 200 tons daily, an independent crushing plant, tube mills, concentrators, cyanide plant, electrical machinery, etc. The ore from the stamps is classified into sand and slime; the sand, after being treated on concentration tables, is ground to slime in two tube mills. This pulp then rejoins the slimes from the classifiers, and the whole product is reconcentrated on Frue vanners. The tailing from the vanners being practically a slime of which 85 per cent. will pass a 200-mesh sieve, is treated by agitation and is then sent to vacuum filters. The precipitation is done by zinc dust. The concentrate and precipitate are shipped to the smelters and are not reduced at the plant. The operating expense is reported to be about $3.50 per ton with a saving of 90 per cent. The ore carries about 20 oz. silver and about $4 gold per ton. The total time of treatment in the agitators is 30 hours. There is no sand leaching.

### Crushing

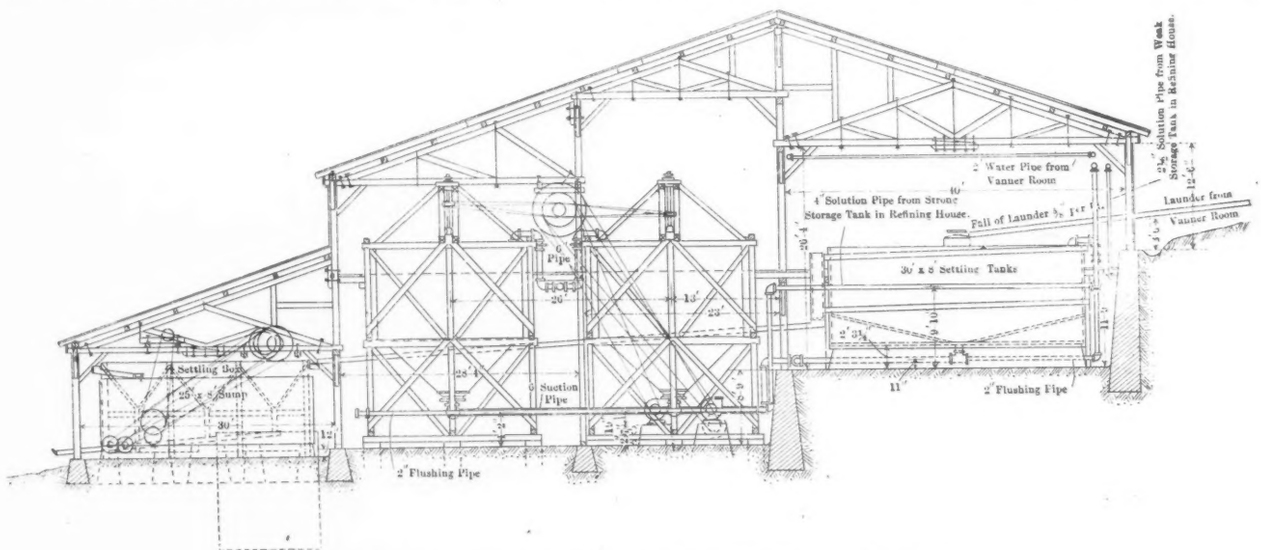
The ore from the mine is dumped into a steel bin at the head of the shaft, and is then drawn through a gate of the counterbalanced type into a No. 5 Gates "K" breaker, which crushes the ore so as to pass a 2-in. ring. The product is delivered to a No. 5 "B" Gates continuous bucket elevator which feeds a Gates 40x12-in. iron frame revolving screen without internal spiders and having 1-in. perforations. The product passing through the holes is delivered directly to the conveyer for transportation to the mill. The oversize which does not pass the holes is delivered by gravity to two No. 3 "D" Gates crushers. These crushers are of the special short-head type for fine crushing and are set to make a product which will pass a ¾-in. ring. The product of these crushers is also delivered to the conveyer above mentioned.

The ore now being all reduced to about ¾-in. size is conveyed by a belt conveyer, having a belt 14 in. wide, to the mill building. This conveyer is about 194 ft. long and travels up an incline of about 40 ft. in this distance. At the entrance to the mill building this conveyer discharges the ore upon another conveyer, about 91 ft. long, of the same size and type, but operating in a horizontal plane at an angle of 30 deg. from the line of the other. This conveyer is provided with an automatic tripper or distributor which travels along the length of the ore bins behind the batteries, delivering the ore automatically into the bins the entire length.

At the point where the ore is discharged from the first conveyer to the second, a Cole automatic sampling device is installed to take a sample of the crushed ore. This is a very ingenious sampler and was devised by D. Cole, assistant manager of the Cananea Consolidated Copper Company. The arrangement is such that a cutter or sample scoop is made to pass through the ore stream and take a sample across the full width of the belt. The frequency of the sampler is determined by the driving mechanism.

The crushed ore is drawn from the bins behind batteries through gates into automatic feeders which are of the suspended or hanging type. There are eight bin gates and feeders, one for each battery.

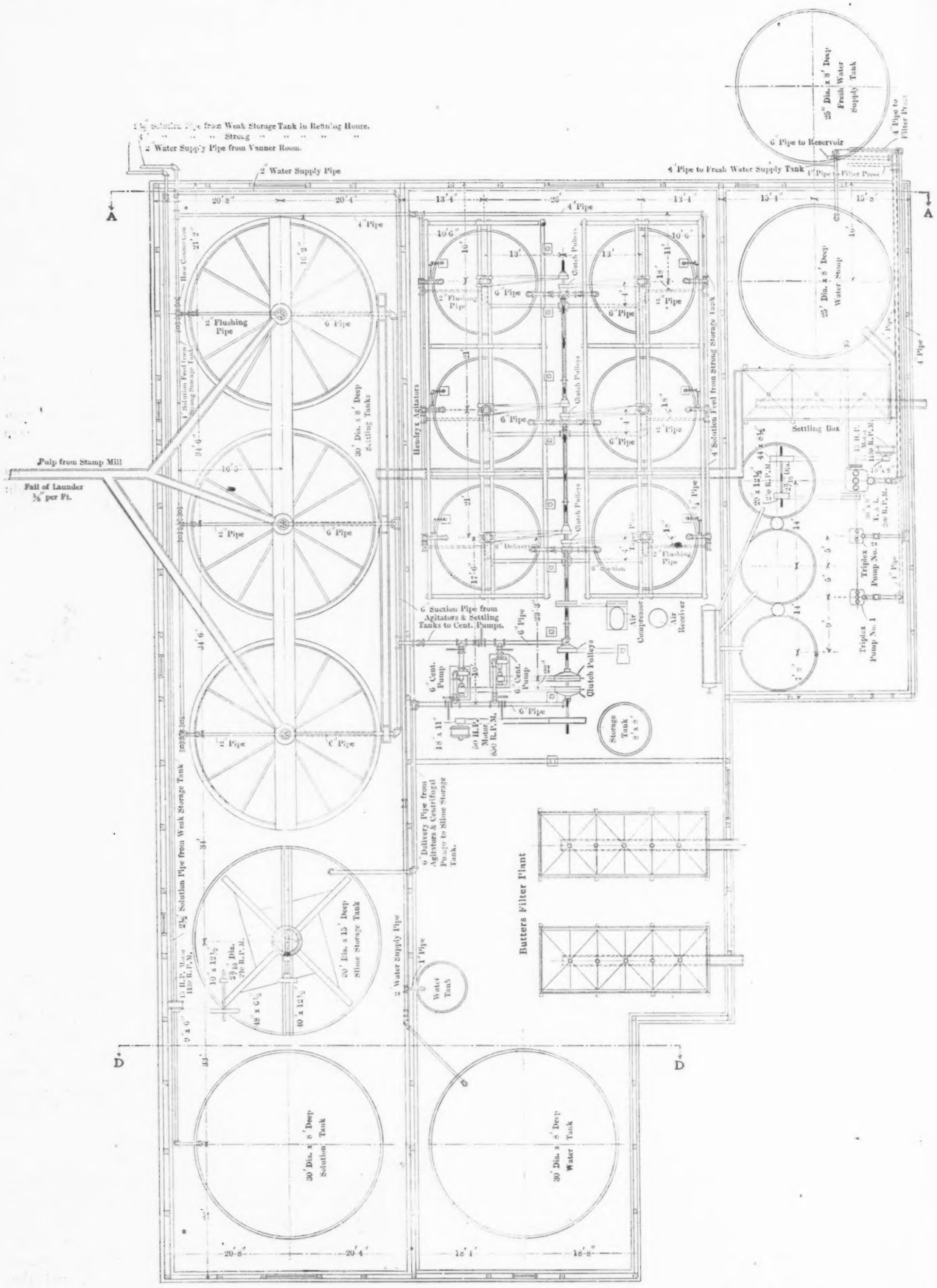
There are 40 stamps weighing about 1050 lb. each. They are arranged in eight batteries of five stamps each in a mortar; each battery is driven by a belt and tightener from the countershaft. The batteries are made right and left handed, and are set in three post frames. The mortars are of the narrow, rapid crushing, quick discharge type, and the principal battery parts are steel to insure maximum wearing life. The ore is crushed through 16-mesh screens.


2" Water Pipe from Vanner Room
4" Solution Pipe from Strong Storage Tank in Refining House.
Fall of Launder ½" per ft.
2½" Solution Pipe from Weak Storage Tank in Refining House.
Launder from Vanner Room
6" Pipe
30' x 8' Settling Tanks
8' Settling Box
25' x 8' Sump
6" Suction Pipe
2" Flushing Pipe
2" Flushing Pipe

SECTIONAL ELEVATION, CYANIDE PLANT, MONTANA-TONOPAH MILL

### Fine Grinding

The pulp from each five-stamp battery is delivered to a 24-in. cone classifier or sizer which makes two products. The spigot, or coarse product of each is delivered to a Wilfley concentrating table, of which there are eight in all, and the overflow from each cone is delivered to the two Dorr classifiers. The tailings


Solution Pipe from Weak Storage Tank in Refining House.
" " " Strong " " " " "
2" Water Supply Pipe from Vanner Room.
2" Water Supply Pipe
4" Pipe to Fresh Water Supply Tank
6" Pipe to Reservoir
4" Pipe to Filter Press
25' Dia. x 8' Deep Fresh Water Supply Tank
25' Dia. x 8' Deep Water Stock
Settling Box
Pulp from Stamp Mill
Fall of Launder ¾" per Ft.
30' Dia. x 8' Deep Settling Tanks
Henley's Agitators
Clutch Pulleys
Solution Feed from Strong Storage Tank
6" Suction Pipe from Agitators & Settling Tanks to Cent. Pumps.
6" Cent. Pump
Air Compressor
Air Receiver
Triplex Pump No. 2
Triplex Pump No. 1
Storage Tank 5' x 5'
6" Delivery Pipe from Agitators & Centrifugal Pumps to Slime Storage Tank.
Butters Filter Plant
2½" Solution Pipe from Weak Storage Tank
2" Water Supply Pipe
1" Pipe
Water Tank
20' Dia. x 15' Deep Slime Storage Tank
30' Dia. x 8' Deep Solution Tank
30' Dia. x 8' Deep Water Tank
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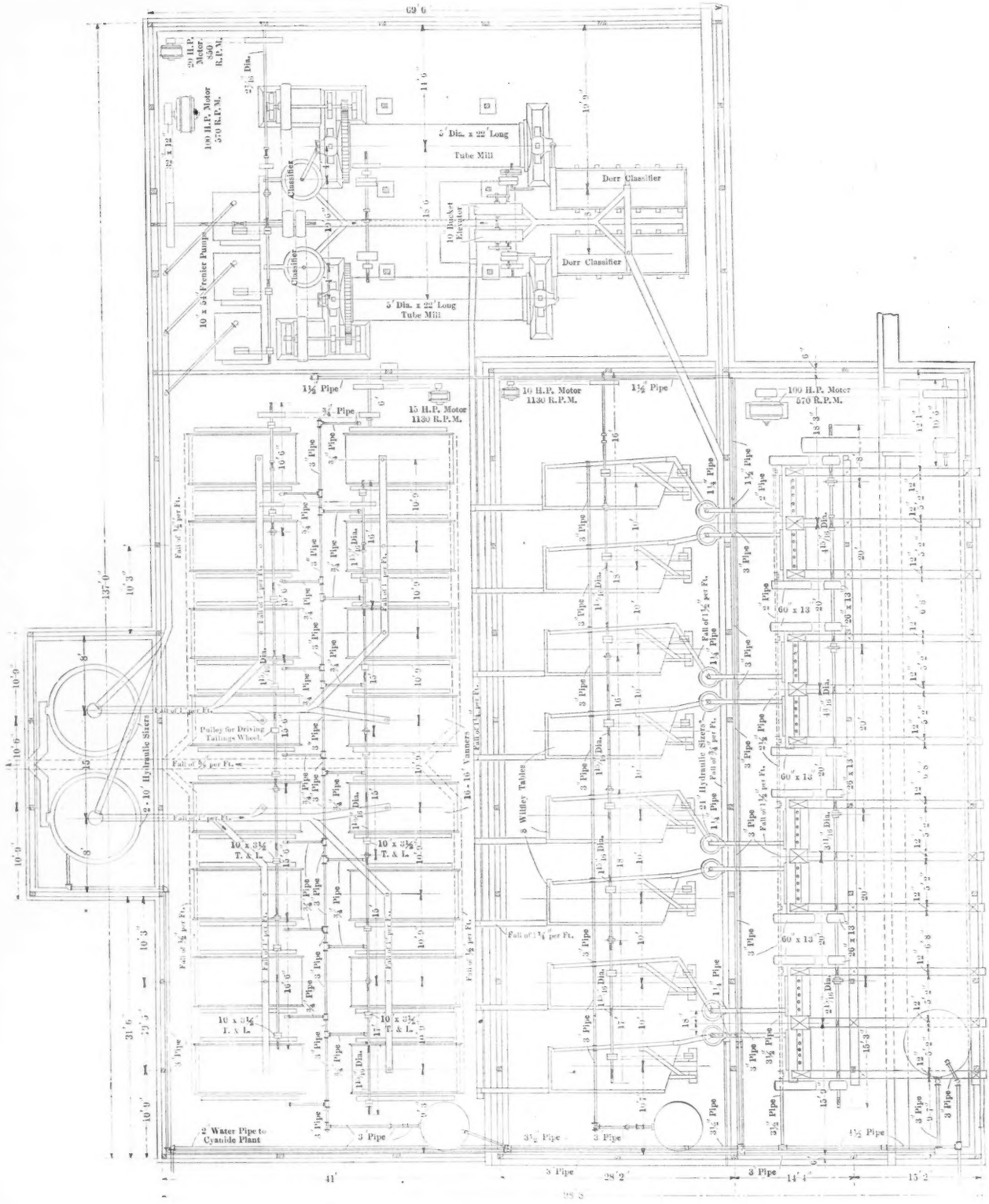
PLAN OF CYANIDE PLANT, MONTANA-TONOPAH MILL




PLAN OF CRUSHING AND CONCENTRATING SECTION, MONTANA-TONOPAH MILL

from the Wilfley tables are also delivered to the Dorr classifiers by belt and bucket elevators which are made necessary on account of the contour of the mill site. In the Dorr classifiers a separation of the sand and slimes is made mechanically. It is aimed to crush all the pulp to 150 mesh and finer in the tube mills and these classifiers separate that part of the pulp which is already crushed to this size and it is delivered to the thickening cones for concentration. The coarse sand product from the Dorr classifiers is delivered into two 5x22-ft. Gates trunnion-type, wet-grinding, spur-gear-driven tube mills. These mills are provided with silex flint brick linings 4 in. thick and the initial charge of pebbles for each mill is 10 tons. The sands are all ground to 150 mesh, or finer in these mills, and each mill discharges its product into a classifying cone 4 ft. in diameter. These cones are for the purpose of separating any sands from the product which might have passed through the mill without being reground fine enough, and these sands are elevated back to the Dorr clas-

sifiers to be again fed to the tube mills.

The finished product is delivered to spiral sand pumps, by which it is elevated to two large settling or pulp-thickening cones, where the excess of water is removed and sent to the cyanide plant. The thickened pulp from the bottom discharge is delivered to 16 Frue vanning machines or concentrators having belts 6 ft. wide. These concentrators remove and collect any fine sulphides after regrinding, in addition to that saved by the Wilfley tables. This concentrate product is collected and dried, after which it is shipped to the smelters.

### Cyanide Plant

The tailings from the vanners and the overflow from the settling cones are delivered as a slime to any one of three dewatering or settling tanks in the cyanide plant. These tanks are provided with filters through which the water is drawn off and flows to a final settling box to collect any slimes carried in suspension, after which it is delivered to a water-sump tank to be pumped back for use in the mill.

The thickened and de-watered pulp from the settling tanks is drawn off from the bottom discharge through a pipe line connected to the suction of a 6-in. centrifugal pump. This pipe line is arranged so that the contents of any tank can be drawn off, and a cyanide-solution pipe is connected up with it to introduce solution if desired. The pulp is delivered by the pump into the agitator tanks. There are six agitators of the Hendryx type for treatment of the pulp, this number being required because silver predominates and the ores require about 30 hours to bring this metal into solution. After the required period of agitation the pulp is drawn from these tanks by a centrifugal pump and is delivered into the pulp-storage tank. This tank is provided with a stirring gear which keeps the pulp in gentle agitation to prevent settling. From this tank the charges are drawn into the filter boxes of the Butter's vacuum system, and the solutions leaving the boxes are precipitated on zinc dust in two Merrill precipitation presses.

This plant has several unique features; it is the first mill treating a silver ore in which all the pulp is slimed and treated by agitation; the extraction is obtained in 30 hours with a 15-per cent. solution of cyanide of sodium; and it is the first silver mill to use zinc-dust precipitation successfully.

## The Determination of Vanadium

By Arden M. Wilson*

The ore treated at the mill of the Vanadium Alloys Company, at Newmire, Colo., is a vanadiferous sandstone, containing usually a very small per cent. of uranium and iron and only a trace of arsenic. When appreciable quantities of arsenic or molybdenum are encountered, these elements are separated in sulphuric-acid solution by means of hydrogen sulphide. For the ordinary determination of vanadium the method employed at the laboratory is as follows:

Weigh one gram of the finely pulverized ore into a No. 3 casserole; add 40 c.c. dilute nitric acid (one to one), and evaporate on the water-bath. Vanadium is indicated by the formation of dark red rings around the sides of the dish. Evaporate to complete dryness, cool, and add 20 c.c. dilute nitric acid and 3 c.c. concentrated sulphuric acid and evaporate until copious fumes are evolved; cool and take up with 30 c.c. cold water. Boil in the casserole until all vanadium is in solution, stirring constantly to avoid loss by bumping. Some vanadium is not dissolved by the strong sulphuric acid, but readily goes into solution upon boiling with the dilute acid. Filter into a tall beaker and wash the silica well with hot water. Boil the filtrate down to a bulk of about 30 c.c., cover with a watch-glass, and add hydrogen peroxide carefully to the hot solution until a permanent deep red color is obtained. Let the mixture stand a moment and then add a concentrated solution of caustic soda until the precipitation of the iron is complete. Dilute to about 200 c.c. with boiling water, and boil briskly for five minutes. Let the mixture stand hot until the precipitated ferric hydroxide has settled, and filter rapidly through a fluted funnel, allowing the filtrate to run into a 600-c.c. Erlenmeyer flask. Wash six times with hot water, dilute to about 350 c.c., and acidify with concentrated sulphuric acid. Heat the solution to boiling and reduce with strong, freshly prepared sulphur dioxide water; enough should be added to give a decided odor of sulphur dioxide and a distinctly blue color to the solution. Boil about 20 minutes to drive off the excess of sulphur dioxide, passing carbon dioxide gas through the solution continually to aid in the expulsion of sulphur dioxide and avoid any possibility of reoxidation of vanadium to the pentoxide form. Titrate hot with potassium permanganate, the standard of which is approximately 1 c.c., equivalent to 0.005 gram vanadium.

Uranium does not interfere in this method, being precipitated along with iron. The separation of the vanadium from these two metals by means of caustic soda is practically complete in one precipitation, whereas in the usual method employing ammonia, two or more precipitations are necessary to effect a complete separation.

For a check method the following is sometimes used: Fuse one gram ore with three to four grams sodium carbonate in a large platinum crucible, keeping the crucible covered, until a quiet melt is obtained; then remove the cover and heat five minutes at a bright red heat to insure the conversion of all the vanadium to the pentoxide. Cool and add about ¼ gram finely powdered sodium nitrate and heat again carefully to a red heat (never hotter) until the fusion is complete. Remove the cover of the crucible and heat a few minutes longer. Cool and leach the melt in a beaker with hot water, boiling, if necessary, to break up all the lumps, and filter into an evaporating dish. Wash the precipitate four times with hot water, best by boiling in the beaker and decanting. Finally cool the filtrate and add carefully concentrated sulphuric acid until acid. Evaporate until the silica settles out as a slimy precipitate; filter and wash 10 or 12 times by boiling the precipitate in the evaporating dish and decanting upon filter paper. Allow the filtrate and washes to run into a 600 c.c. Erlenmeyer flask; dilute the final solution to about 350 c.c. with hot water, reduce and titrate with permanganate as described. Uranium does not interfere.

In case very exact determinations are required blanks are usually run. A quantity of acid and sulphur-dioxide water equal to that used for the regular sample is added to the blank and the two assays are boiled and titrated simultaneously. The amount of permanganate required for the blank is then subtracted from the burette reading on the regular sample. Errors due to impurities in the solution of sulphur dioxide are thus eliminated.

*Chemist, Vanadium Alloys Company, Newmire, Colo.

## Increase in Curtis Turbine Installations

The General Electric Company, Schenectady, N. Y., states that up to Dec. 31, 1907, there had been installed 943 Curtis turbines having an average capacity of 857 kw. per machine. These turbines have a combined output of 807,610 kw. The orders on hand at the close of 1907 were for 153 machines having an output of 266,085 kw. The total sales of these turbines, therefore amounted to 1096 machines generating 1,073,695 kw., or an average of 980 kw. per turbine.

Of the central station and railway traction companies ordering Curtis installations, 71 were of less than 1000 kw. capacity and 190 were larger. This class generates 986,020 kw. Of industrial and miscellaneous plants 243 had less than 1000 kw. capacity and 45 were larger. The Curtis turbine is made in a large range of sizes which makes installations of any capacity simply a matter of choice.

There are four methods other than smelting still in use in Mexico for treating silver ores—the patio process, its offspring the pan-amalgamation process, the hyposulphite process and cyanidation.

# Need of Thorough Ventilation in Coal Mines

## A Study of a Large Number of Colliery Disasters Shows That Lack of Ventilation and Presence of Dust Are the Chief Causes of Explosions

BY J. R. ROBINSON*

Since mining has been carried to lower levels, dangerous gases have become more common, particularly in coal mines, and the presence of the deadly marsh gas makes it imperative that a large amount of fresh air should be circulating through the entire mine, not only to furnish air for the miners to breathe, but a great volume is also required to dilute the gases of the mine and render them non-explosive or harmless.

According to Le Neve Foster, 4 per cent. of marsh gas mixed with 96 per cent. of air forms an explosive mixture. Now, if a mine should generate 4000 cu.ft. per min. of marsh gas, and if 96,000 cu.ft. of air per min. should be passed through the mine, there would still be an explosive mixture, although this volume of air seems large; even if all of the air passed through the faces where the miner works, still there would be an explosive mixture at the face. Only a small portion of the air passed into the mine finds its way to the faces, and is actually used by the men in breathing and diluting the gases generated. It is also well to remember that the miner is working ahead of the air, and consequently a greater portion of air must be supplied than would seem necessary from the figures.

Coal dust is always present in coal mines, and is one of the most dangerous substances, being extremely liable to explosion. It has been studied recently from a scientific point of view. Following is the result of the investigation made by Prof. P. Phillips Bedson, of Armstrong college, one of the scientists called in to investigate the explosion in an air receiver, at Ryhope colliery, England. A long series of experiments were made with various coal dusts, the results demonstrating, "That fine coal dust as it is found on the roadways of a dusty mine, is not a solid, but constitutes a reservoir of explosive gas, and that as soon as this dust is released from the coal, it immediately commences to give off gas." It was found that if the temperature to which the dust is exposed is gradually raised to 212 deg. F., the occluded gases given off are 1.4 times the volume of the coal. He also found that the hydrocarbons contained a large proportion of carbon, and they, therefore, formed an explosive mixture requiring a larger volume of air than the marsh gas that comes off before the heavier hydrocarbons. Prof. Bedson also found that these hydrocarbons were replaced principally by oxygen, and that such dust fired more easily than dust entirely devoid of air. That the results of Professor Bedson's experiments were not found in the many hundreds of analyses of coal dust made previous to his researches, was due to the fact that analyses usually begin only after the dust is heated to the point at which he concluded his extraction of gas. Substantiating Professor Bedson's conclusions is the evidence given by W. E. Garforth before the British Coal Dust Commission. Mr. Garforth showed diagrams of the structure of coal dust magnified to 12,000 diameters. These diagrams showed that some of the coal dust contained pores, and that these were the reservoirs from which Professor Bedson drew his comparatively large volumes of gas.

*Scottdale, Penn.

### Historical Mine Disasters

The terrible mine explosions that have occurred in the last century are painful witnesses to the fact that the dilution of the marsh gas with air was not sufficient; nor in itself was the removal of the marsh gas sufficient. The coal dust must be cared for to make the mine safe. It must be dampened upon the mud of the mine floor, where it is harmless while it is damp. Many of the mines in which explosions have occurred had the equipment to produce the ventilation, but the air was not properly directed to the working faces.

Following is a list of some of these disastrous mine explosions, many of which were caused by improper ventilation:

| | | | Lives lost. |
|---|---|---|---|
| Wallsend Colliery | June, | 1835 | 102 |
| Lund Hill | Feb., | 1857 | 189 |
| The Oaks | Dec., | 1866 | 334 |
| Ferndale | Nov., | 1867 | 178 |
| Blantyne | Oct., | 1877 | 207 |
| Haydock | June, | 1878 | 189 |
| Abercame | Sept., | 1878 | 268 |
| Leaham | Sept., | 1880 | 164 |
| Pendleberry | June, | 1885 | 118 |
| Llanerch | Feb., | 1890 | 176 |
| Red Ash, W.Va | Aug., | 1900 | 46 |
| Berryburg, W. Va | Nov., | 1900 | 14 |
| Port Royal, Pa. | June, | 1901 | 19 |
| Fernie, B. C. | June, | 1902 | 151 |
| Harwick, Penn. | Jan., | 1904 | 178 |

The following reports of the mine inspectors concerning the causes of some of these explosions are instructive:

*Red Ash, W. Va.*—Probable cause advanced by W. N. Page: "The primary cause of the explosion was evidently firedamp. From the effects observed, I think the dust had little or no influence on the primary cause, though it must necessarily have played an important part in the explosion by adding to the forces evolved." The presence of gas in dangerous quantities at the Red Ash mine, however, was not fully realized, consequently some of the expense and precautions for a highly gaseous mine were omitted.

*Berryburg, W. Va.*—Probable theory advanced by J. W. Paul, chief mining inspector for West Virginia: "In the first place, the fan had not been running for several hours, and as the mine has no natural ventilation, the air within the mine was at a standstill. Heavy powder shots had been discharged throughout the mine, and dynamite had been used in the breaking of slate. Under these conditions, the mine was full of powder and dynamite smoke, and it is probable that in the heavy powder shots, a part of the powder was not consumed, or so incompletely consumed, as to evolve a considerable volume of carbon-monoxide gas, which is inflammable and explosive. It is further safe to say that the last dynamite shot fired caused the 18 sticks of dynamite nearby to discharge. This had the effect of stirring up the dust. Following immediately upon this, the powder at the powder box was discharged by some person and this in turn ignited the carbonic-oxide gas and dust, and the mine explosion was the result. The resulting gases were composed largely of carbon dioxide, and would not support life.

*Harwick Mine, Near Pittsburg, Penn.*—Probable theory advanced by J. E. Roderick, chief inspector for Pennsylvania, assisted by nine other State inspectors: "In summing up the facts, we are agreed in the opinion that this explosion was the result of a blown out shot. We also hold to the opinion that part of the mine was not ventilated as required by law. It is further agreed that firedamp existed in a large portion of the advanced workings at the time of the explosion. We also believe that if the volume of air that the fan was capable of producing, running at a reasonable speed, had been properly carried up to the face of the workings, and that the dust had been laid by sprinkling with water on Jan. 25, 1904, such a disaster could not have happened." This disaster was caused by want of ventilation. The shaft bottom beneath the fan, the inlet for air, was nearly closed by ice.

### Explosions not of Rare Occurrence

Here is also submitted an old and quaint account of a mine explosion which occurred about two centuries ago when little was known about the destructive forces of nature. It concerns the disaster at Fatfield, Durham, England, and is

related by Rev. Dr. Arthur Charlett. "On Wednesday, Aug. 18, 1708, at Fatfield Chester-le-Street, about three o'clock in the morning, by the sudden eruption of a violent fire, which discharged istelf at the mouths of the three pits, with as great a noise as the firing of a cannon, or the loudest claps of thunder, 69 persons were destroyed in an instant. Three of them, two men and a woman, were blown quite up from the bottom of the shaft, 57 fathoms deep, into the air, to a considerable distance from the mouth of the pit. The heavy machine by which the coals were drawn up, was blown off by the force of the blast, and what is more wonderful, the fish which were in the riverlet that run 20 yd. under the level, and at as great a distance from the mouth of one of the pits, were in great numbers taken up dead, floating on the water, by several of the inhabitants." Here is a report nearly two hundred years old; compare this with modern reports, and it will be seen that we are making progress slowly but surely.

On May 20, 1902, the eruption of Mt. Pelee, in the West Indies, occurred and destroyed 28,000 lives. The accident has been considerably discussed, and some controversy exists as to whether the natural eruption had anything to do with the mine explosions of 1902; it is a singular coincidence that it occurred in the year of so many disastrous explosions.

There are frequent mine explosions which are not heard of because they cause no loss of life. One instance of this kind is reported from the Grindstone mine of the Pittsburg Coal Company. In 1902, this mine had a disastrous explosion, which destroyed part of the workings, but did not kill any of the miners. The explosion occurred at some time on Sunday or Sunday night, after the miners were all out of the mine. On Saturday afternoon (the mine is worked through a shaft), the shot-firers, after performing their duties, came up out of the pit late in the evening. On Monday morning, when the fire-boss went down the shaft to make his inspection, he discovered that the mine had had a serious explosion, and that the ventilation from the fan was passing down one shaft and then up the other, without making a circuit of the mine.

The fire-boss and superintendent, after due investigation, organized a party and searched the mine, finding the brattices and stoppings everywhere demolished, all doors destroyed, portions of the track torn up, and the mine so filled with débris, that it was difficult for the searching party to get about. After making an investigation for the cause of the explosion, it was found that one of the shot-firers, in his haste to get away on Saturday evening, had neglected to go back and see the effect of the last shot, and that this shot had blown out and left a burning piece of cartridge. It is supposed that this piece of cartridge was left burning on the floor of the mine. The room in which the shot was fired had to fill up with gas before the smoldering cartridge could ignite the gas, and as it would have taken by calculation between 24 and 30 hours for the room to fill with gas, it is assumed that the explosion occurred on Sunday evening.

The ventilation in the Grindstone mine was good in the air courses, but the air was not carried close to the faces. Had this latter been done, such a disastrous explosion would not have occurred; had there been any men in the mine, the accident would have resulted fatally to all.

The only way to obviate the terrible mine disasters that have become so frequent, is to furnish abundant air at the working faces.

## Coal Beds of Pleasant Valley, Utah

The mines of the Pleasant Valley district annually produce about half a million tons of coal, or nearly one-half the entire output of the State, according to Joseph A. Taff, of the U. S. Geological Survey. This district lies at the junction of the Book Cliffs and Wasatch plateau, in Carbon and Emery counties, Utah, extending westward from Castlegate and southward from Schofield through the valleys of the West Fork of Price river and Huntington river. The main line of the Rio Grande Western railroad crosses the coal-bearing rocks at Castlegate, and a branch connects the mines in Pleasant valley with the main line at Colton.

In the Book Cliffs proper, which extend eastward from the vicinity of Castlegate, and in the eastern edge of the Wasatch plateau, the geology is simple, the rocks lying almost flat and the coal measures being admirably exposed in the bold and, for the most part, bare edges of the cliffs. In Pleasant valley, however, near the north end of the Wasatch plateau, and in the cañon of Huntington river immediately to the south, the surface features are smoother, especially in the more elevated parts, though deeply cut into cañons and gulches. Here the edges of the coal-bearing rocks are concealed in a large measure by a covering of soil and weathered rock. Vegetation is also more abundant here than in the lower and more broken lands.

Coal has been prospected and mined at three localities in the Pleasant valley district. These are in Pleasant valley, in Price river cañon in the vicinity of Castlegate, and through and beyond Huntington cañon. In the vicinity of Castlegate, particularly, extensive prospecting and considerable mining have been done.

Analyses of the coals of this area, made at the fuel-testing laboratory of the Survey, show an evenly good grade of fuel, moderately low in moisture and ash and remarkably low in sulphur. Most of the coals have a bright luster and withstand long surface exposure without slacking. On their physical and chemical properties they should be classed as high-grade bituminous coals, and they form excellent domestic and steaming fuel.

## Sizing Anthracite Coal

A statement prepared by W. W. Ruley, of the Bureau of Anthracite Statistics, gives the proportion of the various sizes of anthracite coal shipped to market for a series of years. In the following table the percentages are given at intervals of three years, to illustrate the changes which have taken place:

| | 1898. | 1901. | 1904. | 1907. |
|---|---|---|---|---|
| Lump | 5.1 | 4.1 | 2.5 | 1.9 |
| Broken | 9.2 | 8.3 | 6.9 | 6.5 |
| Egg | 13.3 | 13.1 | 13.2 | 12.6 |
| Stove | 21.2 | 19.7 | 19.6 | 18.2 |
| Chestnut | 18.5 | 19.1 | 19.7 | 19.4 |
| Total large sizes | 67.3 | 64.3 | 61.9 | 58.6 |
| Pea | 13.6 | 14.1 | 14.0 | 13.0 |
| Buckwheat No. 1 | 14.1 | 14.7 | 13.8 | 14.7 |
| Rice and barley | 5.0 | 6.9 | 10.3 | 13.7 |
| Total steam sizes | 32.7 | 35.7 | 38.1 | 41.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

The prominent point in this statement is the increased proportion of steam sizes, which is due to the larger shipments of the smallest of those sizes. This is in part a result of the closer sizing and saving at the breakers; and in part of the operation of washeries on the old culm banks.

The proportions differ in the different regions to some extent. Thus in 1907 the Schuylkill region shipped 54 per cent. of prepared and 46 of steam sizes; the Lehigh region, 57.4 per cent. prepared and 42.6 steam; the Wyoming, 61.3 prepared and 38.7 per cent. steam sizes.

## Coals of Carbon County, Montana

An investigation of the coalfields in central Carbon county, Mont., was made in the autumn of 1906 by N. H. Darton, of the geologists of the U. S. Geological Survey. Coal has been known in this district for more than 20 years. There are 10 coal beds at Red Lodge and their aggregate workable thickness is about 85 ft., including thin partings in some of the beds. In the Bear Creek field, which lies immediately east of Red Lodge, no mining was done until 1900, when a small mine was opened and the product hauled to Red Lodge for shipment. During 1906 the Yellowstone Park railroad was completed from Bridger to the Bear Creek mines, so that the coal now has an outlet by way of the branch of the Northern Pacific from Bridger. Several new mines have been developed in this area within the last few years.

# Colliery Notes, Observations and Comments

## Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

## DEVELOPMENT AND MANAGEMENT

It is false economy to allow débris from falls of roof or sides to pile up alongside of mine roads. It should be removed at once as it is a source of trouble and expense through continually rolling down and causing stoppages.

In shaft mining, the sump should be located in the coal below the gangway level and should have a sufficient capacity to hold at least as much water as will accumulate in two whole days or more, so that there will be plenty of time for repairs and changes in the pumping apparatus.

Where the roof is good, it is advisable to delay setting timbers in the entries until the roof pressure has adjusted itself to the pillars. Where the roof is good, wedges should be driven from the top of the legs toward the middle of the entry so that the pressure will throw the weight over the airway.

Several of the English collieries, which have an average annual output of 300,000 tons, have not had a single fatal accident from falls of roof at the working faces during the last ten years. At some other collieries, the death rate per 1,000,000 tons of output is as low as 0.1. To equal this record should be the ambition of every colliery manager in the United States.

One of the greatest losses of coal in mining is caused by driving the rooms too wide and leaving narrow pillars, which latter are often crushed and lost before they can be removed. Where wide pillars are left, then robbed out and the roof allowed to fall, the first cost per ton is greater but the percentage of total recovery is larger and more than covers the additional first cost.

The seat of trouble in reciprocating pumps, is generally in the valves. For large pumps of this class, which are used for pumping gritty mine water, the double-action valve with guttapercha top, to lessen the noise, and a metal covering on the seat, is best, as the grit lodges on the guttapercha and is washed off at the next stroke, instead of being driven further in as would be the case if the guttapercha were in the seat.

When the underground pumps exhaust steam into the sump, it has often been found that the whole body of sump water is heated to such a temperature as to raise the temperature of the mine and increase the humidity of the air to such an extent that the mine timbers decay rapidly, and the roof and coal in the airways and gangways are so affected as to cause trouble-some falls of rock. If possible, the exhaust of steam into the sump should be avoided.

When the coal fired into a boiler is of uniform size, it is much easier to burn without smoke than when a mixture of different sizes is used. Uniformity of size is one of the essential requirements for smokeless combustion in generating steam. This is especially the case where the chain-grate stoker is used, in which complete combustion of the fuel is effected while it travels the length of the furnace. It is evident that the smaller pieces will be consumed while the larger sizes will not be burned out.

Hydrous coals are divided into three classes: Lignite, pitch and glance coal. Lignite or common brown coal contains a high percentage of water, and has a woody structure. Pitch coal also has a high percentage of water and shows a woody structure. Its aspect is glossy, dark brown or black and it does not soil when handled. Glance coal is hardened and semi-laminated with bright and dull laminæ as in the case of bituminous coal. It contains less water than lignite or pitch coal and seldom shows woody structure.

When building a masonry mine dam, the bricks should be laid in separate rings as is done in bridge building; the space between each ring should be filled with pure cement. Where the wall fits against the coal or stone, cement should be poured in to fill up any interstices, and to run into the cracks in the strata if there are any. Each ring of brick should be built up to the top as tightly as possible and plastered with cement where it joins the natural strata. If there is danger of the roof breaking or the floor heaving, both sides of the dam should be backed with a brick arch and cement should be put in for a length of 3 or 4 ft. on each side the dam.

The amount of danger due to the presence of firedamp in a mine depends greatly upon other conditions, especially the presence or absence of fine coal dust. According to a recent examination, a dusty mine atmosphere containing 2 per cent. of firedamp is highly explosive, and may be ignited by the application of a naked light, whereas in a pure atmosphere free from coal dust, about 7 per cent. of firedamp is necessary to produce a violent explosion. It is further stated that a dry and dusty mine is dangerous when 2 per cent. of firedamp exists in the ventilating current, while in a naturally damp mine about 4 per cent. of firedamp is necessary to sustain an explosion.

That suitable boiler compositions can be prepared is not denied, but can they dissolve old scale without at the same time attacking and corroding the boiler? This scale which consists of dense masses of sulphate and carbonate of lime is deposited under great pressure and is most difficult to dissolve. No substance but a strong mineral acid will do this, and for this reason it is claimed by some engineers that no composition has ever been invented which will dissolve scale without attacking the iron boiler surface exposed to its action. It is also stated that compositions do not remove scale; they merely prevent the formation of new scale by changing the form of the lime and magnesia salts.

Quite a number of electric safety lamps have been tested at the Champhansen colliery, Germany, with the object of discovering the type most suitable for use in mines containing inflammable gases. The use of electric lights by the miner for carrying on ordinary work has not been general on account of the high price of the lamps and the prevailing opinion that the firedamp detectors attached to the lamps were not reliable where a small amount of gas was to be tested. However, the results obtained from tests made at Champhansen with the Bohres and Gülcher lamps were quite satisfactory as regards reliability, portability and length of burning, though there still seems to be room for some improvements in both lamps.

It is a mistaken idea to believe that dynamite is waterproof and that any amount of soaking or steaming will not injure it. Many shot-firers will deliberately soak dynamite in hot water for half an hour, or thaw it with live steam, under the supposition that such treatment does not injure it. Dynamite soaked in hot water for 15 minutes and then allowed to steam for half an hour has been found to have taken up over 10 per cent. of water, enough to reduce the explosive force by half and possibly enough to render it non-explosive. Dynamite left for a day in a thaw house filled with escaping steam has been found to have taken up 18 per cent. of moisture. It is not known exactly how much water is required to render dynamite non-explosive, but 5 per cent. of water greatly reduces the explosive force of any dynamite, and cartridges which contain 12 per cent. of moisture have been rendered non-explosive.

## Metallics

Dynamites have been put on the market in the last few years which are guaranteed not to freeze at a temperature higher than 30 deg. F.

The crude monazite sand obtained in North Carolina varies greatly in grade, but averages about 30 per cent, monazite. It is concentrated to a grade of about 80 per cent.

In recrushing middling and tailing three general types of machinery are used: Chilean mill, Huntington mill and high-speed rolls. For fine grinding, tube mills, ball mills and Wheeler pans are in common use.

Experiments to determine the suitability of uranium as a steel hardening metal indicate that it does not impart any special properties that are not supplied by other metals which are cheaper than uranium compounds.

The occasional presence of iridium in gold scrap is accounted for by the fact that iridium is used in the manufacture of gold pens. It may be recognized by the presence of white hard metallic grains which are not alloyed.

It is proposed to export cement clinker, for use in building the Panama canal, in bulk and grind it on the spot. The idea is to avoid both the heavy cooperage charges and the danger of spoiling ground cement shipped in bulk.

According to a consular report, common-sail-cloth is extensively used in the Aix-la-Chapelle district of Germany for brattice cloth. It is sometimes dipped in a strong solution of water glass before nailing it to the support.

Recent tests by the Forest Service show longleaf pine to be the strongest and stiffest of the common varieties of timber, with Douglas fir a close second; western hemlock, loblolly pine, tamarack, and Norway pine follow in the order given.

For the skip track in inclined shafts, continuous concrete stringers are used at the Ahmeek and some of the other shafts in the Lake Superior district. The steel rails are bolted to these stringers. Little repairing is required on tracks constructed in this way.

Pulsometer pumps are well adapted to shaft work, for, owing to the construction, they are able to handle gritty water. Besides there is no external valve to be broken by flying rock and the pump does not vibrate. The thermal efficiency is, however, generally small.

The floor of the refining room at cyanide mills should be made of concrete and all sweepings from the floor should be saved, as these will be found to assay sufficiently high in gold and silver to pay either to mix with the next sludge to be refined or else to be mixed with the matte or speiss when it is shipped to the smelter.

An ingenious device, copied from a coal conveyer, is in use for moving table and vanner concentrate to the storage bins. It consists of a 6-in. horizontal, endless, rubber belt, to which are attached slats of wood at regular intervals. The slats are dragged by the belt along the bottom of a trough, into which the concentrate is washed and the mineral is scraped forward.

The capacity of an air compressor can be cheaply increased by using, as H. C. Behr has suggested, a blower or a fan to feed the air to the compressor. Whether the cost of the increased air capacity is so high that it is cheaper to do all the compression in the compressor is not known, as no tests have ever been made to determine it. However, when the capacity of the compressor installed is too small, the use of a feed blower is advisable.

In sinking inclined shafts the placing of the drill holes does not differ much from the practice in vertical shafts. When the drilling is done with machines, the center or V-cut is generally used. But, when the inclined shaft follows the vein, with hand drilling and, if the size of the shaft permits, with machine drilling, the cut is often obtained by drilling the cut-holes at a high angle with the footwall, for such a drag, or side, cut is cheaper, provided the ore breaks easily from the footwall.

Stronger detonating caps should be used to explode dynamite in winter than in summer, owing to the difficulty of properly detonating dynamite when chilled. Quintuple caps should be used in cold weather. Recent experiments indicate that even with dynamite properly thawed, a greater effect is obtained when strong detonators are used than with weak detonators, owing to the nearer approach to simultaneous decomposition of the nitroglycerine throughout the charge that results.

Drills should never be lowered loose on a cage, but should be placed in a special car having as long a wheel base as possible so as to avoid the danger of overbalancing when loaded with long steel. All long steel should be lashed tight to the cross piece and sides of the cage, so as to hold the pieces securely. No one should be allowed to ride on the same deck as the steel, for this has been a common cause of accidents not only when the steel was unlashed, but also when it was apparently tightly secured.

The capacity of a stamp mill after it is installed is limited, for the design of the cam prevents unduly increasing the speed of the shaft and hight of drop, while the size of the mortar limits the size of the stamp-head. In the case of rolls the capacity can be somewhat increased by driving the rolls faster. In South Africa many of the stamp mills under construction are being equipped with large mortar boxes, and thick liners; this permits of increasing the weight of the stamp if desirable thus increasing the crushing capacity.

When the litharge method of assaying is used and the number of assays run each day is large, the laboratory should be well ventilated so as to avoid the danger of poisoning from the large amount of lead fumes given off by the crucible charges. In the litharge assay the cost of flux is greater than with other methods, but it is generally considered more accurate than methods relying on borax and sodium carbonates as the main fluxing agents. In the litharge flux small amounts of sodium and potassium carbonates are always added as they render the slag more fusible and reduce the corrosion of the crucible.

The reason why frozen dynamite is dangerous to handle is because the nitroglycerine crystallizes when frozen and these crystals are very sensitive to friction. On this account it is dangerous to break frozen dynamite. Nevertheless, although sometimes frozen dynamite is on this account very sensitive, as frequent accidents show, it is generally very hard to detonate. Frozen dynamite never exerts its full force and even when chilled a great deal of the strength is lost. In fact, tests have shown that often 20 to 30 per cent. of the strength of the dynamite is lost when the dynamite is merely chilled.

The life of mine timbers is short. At the Portland mine, in the Cripple Creek district, Colorado, the average life is about five years. The decay of these timbers has made it necessary to fill the stopes completely with waste before the ore, left in the stopes of the upper levels, can be mined. All ore should be mined as rapidly as is consistent with other conditions so that the expense of retimbering is avoided as much as possible. Each level should be fairly well prospected and all ore in sight mined before the main stopes are worked out, for it is expensive to reopen abandoned level, even if it is merely necessary to retimber or to relay the tracks. The mining should be so planned that the waste from an upper level can be taken elsewhere in the mine to be used for filling stopes. The later development work on an upper level should be so timed that the waste can be trammed to a nearby stope on the level below. The early development on a level should be so timed that the orebodies are outlined on that level before exhaustion is approached in at least the level above and better still in the second level above. In veins, where the country rock or the ore is weak, there is the possibility of too much development, for, as has been said, mine timbers are short lived and repair work is expensive. But the danger is generally that the development work will be kept too little ahead of the stopes, rather than too far ahead.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.

505 Pearl Street, New York.

London Office: 6 Bouverie Street, London E. C., Eng.

CABLE ADDRESS "ENGMINJOUR, N. Y."

*Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Mexico Cuba, Porto Rico, Hawaii or the Philippines. $6.50 in Canada.*

*To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.*

*Notice to discontinue should be written to the New York office in every instance.*

*Advertising copy should reach New York office by Thursday, a week before date of issue.*

*For sale by all newsdealers generally.*

Entered at New York Post Office as mail matter of the second class.

*CIRCULATION STATEMENT*

*During* 1907 *we printed and circulated* 507,500 *copies of* THE ENGINEERING AND MINING JOURNAL.

*Our circulation for April,* 1908, *was* 41,500 *copies.*

| | |
|---|---|
| *May* 2 | 12,500 |
| *May* 9 | 9,500 |

*None sent free regularly, no back numbers. Figures are live, net circulation.*

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**Illustrated.*

## Production of Spelter in the United States in 1907

The production of spelter in the United States in 1907, together with the corresponding figures for 1906 is given in the following table, which is based on reports from all of the producers. The total for 1907 does not differ materially from that which we have previously reported.

PRODUCTION OF SPELTER.

(In tons of 2,000 lb.)

| State. | 1906. | 1907. |
|---|---|---|
| Colorado | 6,260 | 5,200 |
| Illinois | 48,238 | 56,103 |
| Kansas | 129,741 | 133,561 |
| Missouri | 11,088 | 11,594 |
| Oklahoma | ..... | 5,094 |
| East and South | 30,167 | 38,060 |
| Total | 225,494 | 249,612 |

The above table represents only virgin spelter. There is in addition a small annual production of spelter from the dross of galvanizing works and other waste products. It will be observed that Oklahoma appears for the first time as a producer of spelter. The production in that State will no doubt increase greatly in 1908, inasmuch as two works which were not completed until December, 1907, will figure prominently in the statistics of the current year.

## Production of Lead in the United States in 1907

The production of refined lead in the United States in 1907, together with the corresponding figures for 1906, is given in the following table, which is based on reports received directly from the smelters and refiners.

PRODUCTION OF REFINED LEAD.

(In tons of 2,000 lb.)

| Class. | 1906. | 1907. |
|---|---|---|
| 1. Desilverized | 220,095 | 213,383 |
| 2. Antimonial | 7,434 | 9,614 |
| 3. Southeast Missouri | 100,492 | 108,510 |
| 4. Southwest Missouri | 16,528 | 17,833 |
| 5. Miscellaneous | 980 | 790 |
| Total domestic | 345,529 | 350,130 |
| 6. Desilverized | 67,441 | 76,016 |
| 7 Antimonial | 2,686 | ..... |
| Total foreign | 70,127 | 76,016 |
| 8. Grand total | 415,656 | 426,146 |

(2) The production of antimonial lead, which in 1906 was divided according to domestic and foreign, in 1907 has been wholly entered under domestic. (3) Includes two smelters in Illinois, which use chiefly ore from southeastern Missouri. (4) Includes one smelter in Kansas, which uses ore chiefly from southwestern Missouri. (5) Includes small smelteries in Wisconsin, Illinois and Iowa.

In the above table the old classification has been adhered to, although it is now incorrect and meaningless, because it is not easy to suggest an accurate one. The term "soft lead" formerly applied to the lead produced in the Mississippi valley was never of any special significance. The antithesis of soft lead is hard lead, and antimonial lead is the only really hard lead, although some of the lead produced in Missouri and called "soft" figures also in the market as "chemical hard." Desilverized lead is soft lead, and the doubly refined desilverized, known as "corroding lead," is the highest grade of the metal.

The refiners who produced the lead entered as desilverized in the above table did so mainly from Western work-lead, but they bought considerable quantities of non-argentiferous lead ore from Missouri and elsewhere. On the other hand, one of the refiners whose product is entered under "Southeast Missouri," turned it all out as desilverized of exceptionally high grade, and moreover, smelted not only ore from Missouri and adjacent States, but also purchased considerable supplies in the far West. There were in 1907 six companies, operating nine refineries, which produced desilverized lead. At eight of these works the Parkes process is employed; at one the Betts electrolytic process.

In computing the statistics of lead production in the United States there is more or less the same difference as in the case of copper with respect to refined lead and crude lead, the latter being more nearly representative of the production of the mines. We are unable to give statistics compiled strictly on the basis of crude lead, but the following table is prepared partly on that basis and partly on the basis of refined lead, and its total may be considered most nearly representative of the production of the mines of the United States in 1907. It will be observed that the totals in the second table do not agree with the totals in the first table, nor should they, inasmuch as they represent different things.

PRODUCTION OF LEAD BY STATES. (*a*)

(In tons of 2,000 lb.)

| State. | 1906. | 1907. |
|---|---|---|
| Arizona | 2,900 | 1,760 |
| California | 432 | 811 |
| Colorado | 52,992 | 47,332 |
| Idaho | 121,584 | 111,697 |
| Missouri-Kansas | 113,003 | 125,813 |
| Montana | 2,485 | 2,005 |
| Nevada | 1,800 | 3,373 |
| New Mexico | 1,100 | 1,927 |
| Utah | 56,268 | 54,738 |
| Wisconsin (*b*) | 2,100 | 2,380 |
| Others (*c*) | 645 | 401 |
| Total | 355,309 | 352,237 |

(*a*) This table does not include lead in pigments produced directly from ore in Missouri, Kansas, and Colorado, which adds several thousand tons per annum to the total lead production of the United States.

(*b*) Includes Illinois and Iowa. (*c*) Kentucky, Tennessee, Arkansas, Oklahoma, Texas, Oregon and Washington.

The totals in the second table are larger both for 1906 and 1907 than the totals for the first table. This is to be explained by the loss that is experienced in refining the work-lead and also by changes in the amount of work-lead in transit and in stock. Thus certain smelters reported a greater output of work-lead than the refiners reported as received from them. Such differences explain why there was a small increase in the domestic production of refined lead in 1907, while in the same year there was a small decrease in the production based on the figures of smelters which are nearer to the mines. It may be remarked that the total for Idaho agrees very closely with the output of lead in ore reported by the mines of that State, allowing 5 per cent. for loss in smelting.

## The Zinc Ore Question

Judge Burns' decision is a sweeping victory for the smelters of the United States as against the miners who have sought to exclude Mexican and Canadian ores. In upholding the previous decision of the Board of General Appraisers, the smelters are able to import free of duty not only silicate ore, but also sulphide. A strenuous effort is being made to induce the Government to refrain from appealing to a higher court and let the matter rest as it is now. If so, the smelters will be assured of the supply of raw material that they need. Nor should the miners of the Joplin district make any further objection.

It is to their interest that the smelters should live and make a fair return on their investments, and to do so they must have freedom in securing their raw material. At no time since the Mexican ore has been imported have the interests of our miners been jeopardized. When the price for spelter was high they obtained a big price for their ore. Since the price of spelter has been low they have received a comparatively low price for ore, so low indeed that many mines have had to cease producing, but nevertheless so high that the profit to the rank and file of smelters has been zero. The fact that they can obtain some profitable ore enables them to live and pay relatively high prices for the Joplin ore. The latter is of such superior quality that competition for it will always keep up its price. After all, the fear of the Mexican ore has been a good deal of a bugaboo.

## Copper at Tombstone

One of the most interesting developments, both from the commercial and the geological standpoint, is now going on at Tombstone, Arizona. Our readers are familiar with the bold undertaking of the Development Company of America in reopening the famous mines of that place, which had been idle for many years, and the immense amount of water that has had to be pumped, its unexpected volume causing a delay in the consummation of the plans of the company. However, the water has been coped with successfully and explorations have been conducted in the lower levels. One of the results of the prospecting has been the discovery of promising bodies of copper ore. Not much is yet known as to their extent, but the veins of Tombstone are so large and strong that there is good basis for the hope that the copper deposits will turn out to be large.

The ores of Tombstone occur in fissure veins intersecting a series of sedimentary rocks, and also in irregular bodies in limestone. In the upper levels the ores were of two kinds, viz., quartzose ore containing silver and gold with some lead, which was treated by pan-amalgamation, and basic ore, the characteristic of which was manganese. Little or no copper was in evidence. Consequently, Tombstone in showing copper at depth is duplicating the experience of Butte. The question as to whether it has similar deep-lying zones of secondary enrichment is one that only exploration can answer, and its progress will be watched with interest.

THE MONTH OF APRIL appears to have seen business at the lowest ebb since the present industrial depression began, the report of the American Railway Association having shown that in the United States and Canada on April 15 there were 375,770 idle railway cars, the largest number idle in the history of American railways. These statistics which refer directly to the movement of freight are a very good index of the business situation. Earlier in the year there was a decrease in the number of idle cars, showing a certain recovery in business, but this appears to have been merely the result of ability to wind up previous contracts, deferred by the panic of October, and thereafter business passed again into a sluggish channel. The report of the Steel Corporation for the first quarter of 1908 was also of a character to dispel ideas of a rapid recovery in business. The brightest feature of the recent situation has been the success in floating the Pennsylvania bonds and certain other new issues, which has stimulated some activity in Wall Street. After all, the anticipation of Wall Street will be the first evidence of renewed activity in business that all are looking for.

SOME TIME AGO one of our correspondents called attention to undecipherable signatures, i.e., especially in correspondence. This appears to be particularly a failing on the part of those whose letters are typewritten. An excellently typewritten letter is often signed by the writer in such a way that an expert is required to determine the name of the writer. We receive many such letters, and lose a good deal of time in discovering the name of the writer in order to reply. Occasionally we are unable to discover the name, and then are unable to reply. The correspondent who called attention to this matter suggested that persons writing illegible signatures should have printed on their correspondence, say in the lower left-hand corner, some such legend as "this letter was written by John F. Smith." Another easy method is to have the typewriter print the signature, and let the writer of the letter affix alongside his actual signature. This method is indeed practiced by some persons who recognize the failing of their handwriting.

PROFESSOR JAGGAR, OF THE Massachusetts Institute of Technology, is bestirring himself in an effort to secure from the Legislature of Massachusetts the creation of a State geological survey. It is to be hoped that he will succeed. Every State that has mineral resources ought to have a geological survey. Massachusetts not only has an important quarrying industry, but also has several important mines.

# Views, Suggestions and Experiences of Readers

**Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information**

## CORRESPONDENCE AND DISCUSSION

### The Responsibility for Recent Coal-mine Disasters

The recent disasters in West Virginia and Pennsylvania have brought forth loud protests as to the existing dangerous conditions of our Eastern coal mines. From the mass of opinions expressed, I was forcibly impressed with what one superintendent had to say. He dwelt principally upon the disregard for, and the laxity in enforcing, our State mine laws, and continued, "That 90 per cent. of our explosions are due to the present haphazard systems of mining coal," and "that lack of discipline, unsystematic work, and failure to enforce the mining laws in connection with a get-the-coal-out and never-mind-the-law sort of a spirit, is where our chief trouble lies."

It is known by all mining men that the mine laws are constantly and boldly violated. I do not agree with the statement so often made that most of our accidents are due to the fact that our miners have no regard at all for the mine law, but am rather of the opinion that a large proportion of the fatalities in the mines of this country is directly traceable to ignorance of mining.

Many foreigners are permitted to work underground as miners before they have had experience. There is a prevailing evil practice among such men, which, although it is carried on extensively, is not generally known to many mine foremen. An actual occurrence of the bad practice in question as witnessed by myself was as follows: A foreigner presented himself one morning at the foreman's office and in the usual entreating style, peculiar to men of his class, sought employment. Among the usual questions asked by the foreman was, "Have you a miner's certificate?" The reply was in the affirmative. After assigning the man to a working place and handing him over to the fire-boss in whose district he was to work, the foreman requested of him the certificate of competency as a miner, whereupon the foreigner handed it to him. After looking it over the foreman informed him that he would keep it and return it to him when he desired to go elsewhere. The foreigner, becoming suddenly alarmed, exclaimed that the certificate belonged to another fellow, and lost no time in departing, after the foreman, highly incensed, handed him the certificate and ordered him off the premises. The miner from whom he had borrowed the paper had evidently not been asked to deposit it by the foreman of the mine where he was employed.

I was more surprised when later I learned that this evil practice was generally carried on, and that many certificates were illegally obtained in various places in spite of the fact that the laws regulating their issue were intended and thought to meet all the requirements necessary to avoid fraud. Furthermore, the foreman told me that a justice of the peace was selling them at a dollar each. The foreman who had learned of this, personally went with the informer and bought a certificate. Whether or not the signatures of the examining committee had been forged, he did not ascertain. Is it surprising, then, that many of our miners are illegally employed and are incompetent, and consequently are a menace to the safety of the mass of underground toilers?

#### An Instance of Ignorance

I recall another instance of gross carelessness on the part of a foreigner who had legally obtained a certificate and who was considered a competent and trustworthy workman. The fire-boss one day while attending to his duties in the mine, detected the smell of smoke, and going against the current and through the workings, came upon a raging fire in the face of the place worked by the aforementioned miner. Hastening at once for assistance, he came upon the foreigner on the roadway preparing to go home after his day's work. When questioned as to what he had done, the latter stated that he had stripped his safety lamp and ignited a small pocket of gas in the roof. In answer to why he went away and allowed it to burn, without any attempt to extinguish it or sound an alarm, he said that he thought it would burn out of its own accord.

The experience of mine foremen with this class of workmen has been similar all over the country. Discharged for incompetency, misconduct, or violation of the law, even if punished for it, they leave for another place and soon find employment. We need the foreign element; the output necessary to meet the trade demand could not be mined without them; but we do not need the ignorant, inexperienced, incompetent and reckless foreigners who either cannot or do not comprehend what danger is and when it is present. It is high time that the offenders guilty of illegally granting certificates should be called to account; that to any man presenting a certificate not his own, together with the man who permits him to use it, should be meted out some severe punishment.

#### Greatest Losses Are Among Foreigners

There is no doubt that ignorance and incompetency are direct causes of many of the fatalities recorded each year. A newspaper recently contained abstracts from the report of one mine inspector for the year 1907 about to be forwarded to the department of mines. The article could not be missed. Set up in large boldfaced type, the head lines read: "Reports on Mine Fatalities Show Greatest Loss is Among the Poles." In the district referred to, there were 37 fatalities, 18 of which were Poles; 5 were divided among American, Welsh, and German; the remaining 14 were: Italian, 1, Slavonian 2, Lithuanian 5, Austrian 2, Russian 4. This is but one district, and an examination of other annual reports will show similar statistics elsewhere. It is true that mine laws could be enacted which would impose punishment and fine on those guilty of violation, or would make it obligatory for a foreman or his assistant to suspend promptly a man for either cause. But the law should go farther and be framed in such a way as to prevent his employment the next day by a foreman at another operation, and, if necessary, the miner's certificate should be taken from him, thereby preventing his employment as a miner until he is made to understand that he must prove his competency, obey the law, and learn to observe and regard danger when it is present.

The article in question accused mine officials of being afraid to enforce the law. That is not true in the majority of cases. Laws are daily violated, but the statements about dangerous systems, and disobedience of the law, which are flung at the operator and his agents after a disaster has taken place, are many times unwarranted. It is a well known fact that most operators will promptly call an official to task when he receives notice from an inspector that a law is being violated and must be observed. Then again there are foremen who will not await the assent of the operator to enforce the law; they realize fully that lives and property are under their supervision and that the avoidance of accidents resulting from violations of the law or from reckless prac-

tices, comprise one of the first and most important responsibilities entrusted to them. Again, there are a few inspectors who are backward in notifying a foreman of a lack of discipline.

A Conscientious Mine Inspector

One of the best and most fearless mine inspectors that the department of mines of Pennsylvania ever had the fortune to possess, was very pertinent in telling a foreman or operator that laws were being disobeyed when he demanded a change. One operator completely ignored the inspector's orders given verbally on his periodical visits, and later by letter. The inspector appealed to his chief for instructions as to further procedure. The matter, after being submitted to a board of arbitration which decided favorably to the inspector, was taken to court, where the contention of the inspector was again sustained. The operator, in addition to bearing the expense, had to fulfil the requirements of the law.

Other operators in the vicinity, and the public in general, commended the inspector for the stand he had taken and the good he had done. During his subsequent visits to the colliery the treatment he received was anything but pleasant, but he stuck to his post and discharged his duties according to his honest convictions and for the safety of several thousand men. Upon retiring from the mine-inspection service, he was promptly engaged by one of the largest of coal-mining companies as assistant mine superintendent over all its operations. Such an instance, and there are others, disproves the statement that operators give no encouragement to the enforcement of the law.

Mine officials and State inspectors know the law and are expected to see that it is obeyed; but they hardly deserve the unjust criticisms they often receive after they have fulfilled their duties to the best of their ability.

J. H. Haertter.

Wilkes-Barre, Penn.
April 6, 1908.

## The Editor of the Department of Mines, Ottawa, Canada

In the issue of the Journal of April 18, appears a "Personal," referring to myself, which requires some correction. In the first place, the name is not Graves, but Groves. Secondly, my appointment was not to displace anyone, for the office of editor, Department of Mines, is a newly created position, and I happen to be the first incumbent of the office. The Department of Mines is divided into two sections: (1) Geological survey branch; (2) mines branch. The editor prepares the publications of both branches.

Samuel Groves.

Ottawa, Ont., April 21, 1908.

## Definition of "Margin"

I should like to have a definition of the various meanings of the word "margin," with its various prefixes, as applied in the smelting industry. I have found that very few persons employ the word with exactly the same sense.

To me, margin is the difference between the cost of an ore and the value of the metal obtainable from it, based on the market value of the metal when the settlement is made. "Quotation margin" is the gain or loss of value in the extractable metals due to the fluctuation in the price of the metals between the date of settlement and the sale of the product. "Gross margin" is the final gain or loss, being the difference between the amount paid for an ore and the value of the metal extractable at the date of sale of the product. "Net margin" is the actual profit after deduction of smelting cost and losses. Net margin is divided into three parts; viz., (1) treatment charge; (2) margin on metals; (3) margin due to variation in metal prices. It would be well to invite criticism from the readers of the Journal, with a view to establishing a definite standard. Smelter.

Denver, Colo., April 2, 1908.

[This subject was discussed rather fully in the Journal of August 3, 1907. We think that the understanding expressed by our correspondent represents that which is most generally held in the smelting industry. It might be well to substitute the term "ultimate margin" for "gross margin" and there does not appear to be any necessity for the term "net margin," which our correspondent employs as an equivalent of "profit."—Editor.]

## Value of Strontianite

On page 664 of the Journal of March 28, 1908, it is stated that the average selling price of strontianite was $420 in 1905 and $390 in 1906. Is there not some considerable error in these figures? In "The Non-metallic Minerals," by Dr. Merrill, the value is given as $2.50 to $4 per ton; and the retail list price in Hamburg is about $3.50 per 100 lb.

DeGolia & Atkins.

San Francisco, Apr. 15, 1908.

[There was, indeed, an error in the figures and we thank our correspondent for calling our attention to it. The average value of 5595 tons of calcined witherite and strontianite imported into Germany in 1907 was 80 marks per metric ton; while the average of 1462 tons exported was 90.3 marks. These averages correspond to about $20 and $22.50 respectively. Although it is not so stated in the official reports, we fancy that the major portion of both imports and exports was calcined witherite. We suspect that the omission of decimal points may have been overlooked in the note referred to.—Editor.]

## Plan for Working Mine

In the Journal of March 21 I find a letter entitled, "How Should this Mine be Operated?" It appears to me that by describing how we extract the product of the Soudan hard-ore mine, Soudan, Minn., I shall answer the query at least partially.

The shaft is sunk in the foot wall at an angle of about 78 deg. following the pitch of the ore, and levels are driven every 100 or 200 ft. These main levels are all timbered; chutes and man-ways are started every 25 ft. Before we begin to timber, the stopes are mined from foot to hanging 20 ft. high. When the timber is in and lagged, we tap the raises already raised, advanced to the level above which is probably worked out, and tap the old rock fill into the stope. As fast as the fill covers the timber, the cribbed chutes and man-ways are raised; and as soon as the fill is completed we start back stoping, using No. 3 Rand drills. In narrow veins we sometimes make this rock fill by cutting out from either side of the vein which we have carried up, in extreme cases, to 24 in. wide. In cases where the vein is too narrow and it is necessary to bring up our chutes in the country rock, we gradually draw them over until they are directly over the main timber and then raise with the vein. In a vein as narrow as the one described in the letter of inquiry, this could be worked to advantage; the rock fill could be brought from the sides very cheaply.

P. F. Chamberlain.

El Paso, Texas, March 23, 1908.

## Market for Feldspar

We have been mining, in the State of New York, a high grade of feldspar, but have been selling our product exclusively to potteries. However, inasmuch as this market is extremely limited, and on account of the present depression in business, we are compelled to find a larger field for our mineral. What other industries are users of feldspar?

B. G. M.

New York, April 12, 1908.

[Practically all of the high-grade feldspar produced in the United States is used in pottery work. Some experiments have been made at Henryton, Maryland, and elsewhere, with a view to the use of ground feldspar as a fertilizer, it being contemplated that potash may be secured in this way more cheaply than from the imported potassium salts. We know of only one other use for feldspar, which is for surfacing some of the tar and felt compositions for ready roofing. In this work feldspar takes the place of ordinary gravel, but it is superior to the latter because of its pleasing light color. For this purpose the presence of mica in the feldspar is not objectionable; indeed, it is rather desirable.—Editor.]

## New Publications

COURS D'ELECTRICITE. Tome III. By H. Pellat. Pp. 285; illustrated. 6½x10 in.; paper. Paris, 1908: Imprimerie Gauthier-Villars.

HYDRAULIC ENGINEERING. By Gardner D. Hiscox. Pp. 315; illustrated. 6¼x9¼ in.; cloth, $4. New York, 1908: Norman W. Henley Publishing Company.

THE GEOLOGICAL MAP OF ILLINOIS. By Stuart Weller. Second Edition. Bulletin No. 6. Pp. 34. 6x9 in.; cloth. Urbana, Ill., 1907: University of Illinois.

THE DATA OF GEOCHEMISTRY. By Frank Wigglesworth Clarke. United States Geological Survey. Bulletin No. 320. Pp. 716. 6x9 in.; paper. Washington, 1908: Government Printing Office.

MARTIN'S MINING AND WATER CASES OF BRITISH COLUMBIA, WITH STATUTES. Vol. II, Part II. By Hon. Justice Martin. Pp. 572. 7x10 in.; paper, $7.50. Toronto, Canada, 1908: Carswell Company, Ltd.

DIE BERGWERKS-INSPEKTION IN OESTERREICH. Berichte der k. k. Bergbehörden über ihre Tätigkeit im Jahre 1905. Pp. 489. 6x9 in.; paper, Wien, 1907: Manzschen k. u. k. Hof-Verlags- und Universitäts-Buchhandlung.

RESULTS OF PRIMARY TRIANGULATION AND PRIMARY TRAVERSE, FISCAL YEAR 1905-6. By Samuel S. Gannett. Bulletin No. 310, United States Geological Survey. Pp. 248. 6x9 in.; paper. Washington, 1907: Government Printing Office.

PORTLAND CEMENT MORTARS AND THEIR CONSTITUENT MATERIALS. By Richard L. Humphrey and William Jordan, Jr. United States Geological Survey. Bulletin No. 331. Pp. 131; illustrated. 6x9 in.; paper. Washington, 1908: Government Printing Office.

DIE ERZLAGERSTAETTEN VON PITKARANTA AM LADOGA-SEE. By Otto Trüsedt. Bulletin No. 19, de la Commission Géologique de Finlande. Pp. 333; illustrated. 6½x10 in. Helsingfors, 1907: Frenckellska Tryckeri-Aktiebolaget.

DEVELOPMENT AND ELECTRICAL DISTRIBUTION OF WATER POWER. By Lamar Lyndon. Pp. 317, illustrated. 6x9¼ in.; cloth, $3. New York, 1908: John Wiley & Sons; London, 1908: Chapman & Hall, Ltd.

Contents: Hydraulic development. Electrical equipment. Descriptions of hydro-electric generating and transmission plants.

PRACTICAL EARTHWORK TABLES. By C. E. Housden. Pp. 50; illustrated. 5x7¼ in.; cloth. New York, Bombay and Calcutta, 1907: Longmans, Green & Company.

This is a convenient little book giving tables for estimating earthwork in connection with roads, railways, canals, dams, etc. Their simplicity commends them and they will be found not only useful, but also more or less novel.

THE BLAST FURNACE AND THE MANUFACTURE OF PIG IRON. By Robert Forsythe. Pp. 368; illustrated. 6½x9½ in.; cloth, $3. New York, 1908: David Williams Company.

Contents: Introductory. Materials of manufacture. Description of plant. Operation of the furnace. Burdening the furnace. Action within the furnace. Furnace irregularities. Hints on design and equipment. Supplement. Appendix.

GENERAL PAPERS ON THE PRODUCER-GAS POWER PLANT, THE COAL-BRIQUETTING INDUSTRY, AND COAL-MINE SAMPLING, WITH A BIBLIOGRAPHY OF GEOLOGICAL SURVEY PUBLICATIONS ON COAL, LIGNITE, AND PEAT. By R. H. Fernald, E. W. Parker, J. S. Burrows, W. T. Lee, and J. M. Nickles. Extract from Bulletin No. 316, Contributions to Economic Geology, 1906, Part II. United States Geological Survey. Pp. 439-532. 6x9 in.; paper. Washington, 1907: Government Printing Office.

THE GEOLOGY OF THE HUNTER RIVER COAL MEASURES, NEW SOUTH WALES. By T. W. Edgeworth David. Memoirs of the Geological Survey of New South Wales, Geology No. 4. Department of Mines and Agriculture. Pp. 372; illustrated. 10x12 in.; board covers. Sydney, 1907: W. A. Gullick, Government Printer.

Contents: Description of geological sections. General description of the geological map of Hunter River coalfield. General Summary. Appendix.

USEFUL INFORMATION FOR PRACTICAL MEN. Pp. 216; illustrated. 4x7 in.; leather, $1. Wilmington, Delaware, 1908: E. I. Du Pont de Nemours Powder Company.

This is a very useful little handbook, which contains data respecting general engineering practice presented in a more convenient form than in some of the more elaborate handbooks. In the portion which deals with the subject of explosives, this handbook is unique, and is, of course, authoritative. We are sure that the publication will meet with much appreciation.

TECHNICAL METHODS OF ORE ANALYSIS. Third Edition. By Albert H. Low. Pp. 344, illustrated. 6x9 in.; cloth. $3. New York, 1908: John Wiley & Sons; London: Chapman & Hall, Ltd.

Contents: Apparatus. Electrolysis. Logarithms. Aluminum. Antimony. Arsenic. Barium. Bismuth. Cadmium. Calcium. Chlorine. Chromium. Copper. Fluorine. Iron. Lead. Magnesium. Manganese. Mercury. Molybdenum. Nickel and cobalt. Phosphorus. Potassium and sodium. Silica. Sulphur. Tin. Titanium. Tungsten. Uranium and vanadium. Zinc. Combining determinations. Boiler water. Coal and coke. Testing crude petroleum.

PRACTICAL HYDRAULIC TABLES AND DIAGRAMS. By C. E. Housden. Pp. 106; illustrated. 5x7¼ in.; cloth. New York, Bombay and Calcutta, 1907: Longmans, Green & Company.

Contents: Formulæ and preparation of tables and diagrams. Preparation and explanation of tables. Velocity in pipes, and minor losses of head. Incrustation in pipes. Preparation of diagrams for ascertaining sizes of pipes, drains, and sewers. Calculation of discharges to be provided for. Tables and diagrams. Application of tables to water-supply schemes. Application of tables and diagrams to surface drains and masonry sewers.

This little book gives in a convenient form a series of tables and diagrams, together with the formulas from which they were deduced and explanatory notes, for determining the sizes of pipe for systems of water supply. It appears useful, but to what extent it will be can hardly be determined without a practical trial of it. The author is superintending engineer of the Public Works Department of India, and states that the present tables were originally compiled for his own practice, which naturally tends to commend them.

THE ENGINEERING INDEX FOR 1907. Compiled from the Monthly Index published by the *Engineering Magazine*. Pp. 450, 6½x9½ in.; cloth. New York and London: *The Engineering Magazine*. Price $2.

This volume, the sixth in the series, is arranged on much the same plan as Volume V. In the earlier volumes—each of which covered a period of several years—a strictly alphabetical order was followed. When the yearly issue was begun, this was changed to a classified system. The articles indexed are first grouped under the great divisions of engineering practice—civil, mechanical, mining, electrical, etc.—and under these again they are grouped according to the recognized special divisions of each field. Upon the whole this appears to be the most convenient arrangement for reference by the reader, who has generally a definite idea of the subject upon which he wants to find information, but often comparatively little information as to the titles of books or articles, or the names of authors. The issue of the volume yearly adds much to its use and convenience, as it is then always nearly up to date. The range of the index is shown by the statement that civil engineering covers 80 pages, with about 20 entries to the page, on an average; electrical engineering takes 65 pages; industrial economy, 16; marine engineering, 18; mechanical engineering, 112; mining and metallurgy, 77; railroad engineering, 45; street and electric railways, 21 pages.

## The Zinc Ore Question

Following is the recently rendered decision of Judge Burns of the United States Circuit Court, Southern District of Texas, Laredo Division, in the case pertaining to the importation of zinc ore into the United States, which has been pending for a long time:

This is an appeal in the nature of a petition to review the action of the Board of General Appraisers in holding the several importations in question subject to duty under paragraph 181 of the tariff act of July, 1897. Said paragraph is as follows: "Lead-bearing ore of all kinds, 1.5c. per lb. on the lead contained therein."

The counsel for the importer concedes that this assessment is correct; and while the action of the collector of customs in so assessing duty was embraced in the original protests, it was abandoned upon the hearing, and, therefore, is not at issue here. The appellant in its petition complains of the action of the board in not sustaining the action of the collector in assessing an additional duty of 20 per cent. ad valorem under paragraph 183 on the value of the zinc contents. The importations involved in the several protests consist of zinc ore; and the importer in his protests claims the same to be free of duty under paragraphs 514, 614, 629, or in the alternative, that in the event the same is subject to duty, only the lead contents thereof are dutiable at the rate of 1.5c. per pound.

In so far as the specific duty is concerned the question presents no difficulty; the language clearly and specifically provides that the lead contents shall be subject to duty at the rate assessed by the collector. Besides, as suggested, this feature has been eliminated by the counsel for the respondent, and, therefore, not a subject for further inquiry.

The single question here presented is, are the ores free of duty under paragraphs 514 and 614, or subject to duty at the rate of 20 per cent. ad valorem under paragraph 183? If the latter provision does not apply, it follows that the General Board is not in error in holding the importations not subject to the ad valorem tax.

Paragraph 183 is as follows: "Metallic mineral substances in a crude state, and metals unwrought, not especially provided for in this act, 20 per cent. ad valorem."

From the evidence in this case it appears that the zinc as metal is not found in the ores involved herein, nor are they metallic mineral substances, and, therefore, not subject to duty under paragraph 183. This conclusion is reached from the entire record as an original proposition, and is supported by the opinion in the case of Hempstead *v.* Thomas (122 Fed. Rep., 538).

The court is of the opinion that the importations in question are free of duty under sections 514 and 614, and the contention of appellant cannot be sustained that the latter section is without application by reason of the importations having been advanced in value by what is claimed as "a process of manufacture"; said process consisting of eliminating the rock and dirt by hand and hammer, in order to reduce the bulk and save the paying of freight charges upon useless and foreign matter; this contention would require a broad stretch of the imagination to designate the labor performed as "a process of manufacture."

The case cited, Hempstead *v.* Thomas (*supra*), is conclusive of the contention made by the appellant. It follows as a conclusion of law:

First, that the provision for lead-bearing ores in paragraph 181 under the facts in this case, is exclusive, and that the importations are not subject to additional duty.

Second, that paragraph 183 is without application to the merchandise in question.

Third, that the ores are free under paragraphs 514 and 614 of the tariff act of 1897.

The petition of review disclosing no error, the finding of the Board of General Appraisers should be in all things affirmed; and the decree will so provide, with directions to the collector of customs to liquidate the entries in accordance with this holding.

## Mineral Production of Germany

The advance figures from the official report of mineral production in Germany for the past year are published in *Glückauf*; they do not show any considerable changes from the preceding year.

### Coal and Iron

The production of coal, iron ore and pig iron is given below, in metric tons; the figures show only very slight changes from the preliminary statements heretofore published in the Journal:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Coal | 137,117,926 | 143,168,301 | I. 6,050,375 |
| Brown coal | 56,419,567 | 62,559,364 | I. 6,139,797 |
| Total | 193,537,493 | 205,727,665 | I. 12,190,172 |
| Iron ore | 26,734,570 | 27,705,504 | I. 970,934 |
| Pig iron | 12,292,819 | 12,875,159 | I. 582,340 |

Iron ore in 1907 includes 8377 tons mined in connection with other ores. Of the total output last year, 14,107,518 tons, or 50.9 per cent. of the total, came from Elsass-Lothringen; 7,492,870 tons, or 27.1 per cent., from Luxemburg.

The production of petroleum was 81,350 tons in 1906, and 106,379 in 1907; an increase of 25,029 tons; that of asphalt was 117,412 tons in 1906, and 126,649 in 1907; a gain of 9237 tons.

### Metallic Ores

The production of ores, other than iron ore, was, in metric tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Gold and silver ore | 8,066 | 8,280 | I. 214 |
| Copper ore | 768,523 | 771,227 | I. 2,704 |
| Lead ore | 140,914 | 147,272 | I. 6,358 |
| Zinc ore | 704,590 | 698,425 | D. 6,165 |
| Manganese ore | 52,485 | 74,683 | I. 22,198 |
| Arsenic ore | 6,249 | 4,872 | D. 1,377 |
| Pyrites | 196,971 | 196,320 | D. 651 |
| Miscellaneous | 9,158 | 8,984 | D. 174 |

Of the copper ores last year 680,487 tons came from the Halle district, in which the Mansfeld mines are situated.

### Metals and By-products

The production of metals, other than iron, was as follows; gold and silver in kilograms, others in metric tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Gold, kg | 4,202 | 4,682 | I. 480 |
| Silver, kg | 393,442 | 386,933 | D. 6,509 |
| Copper, tons | 33,046 | 32,473 | D. 573 |
| Tin, tons | 6,597 | 5,864 | D. 733 |
| Lead, tons | 150,741 | 142,571 | D. 8,170 |
| Spelter, tons | 205,692 | 208,195 | I. 2,503 |

Gold and silver include metal obtained from imported ores and bullion. Copper in 1907 includes 197 tons black copper and 330 tons bullion and matte; 31,946 tons being refined copper. Tin includes metal from imported ores and concentrates.

The production of metallic salts and other by-products from metallurgical works was as follows, in metric tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Tin chloride | 987 | 1,812 | I. 825 |
| Arsenic | 3,052 | 2,904 | D. 148 |
| Iron sulphate (copperas) | 13,376 | 14,033 | I. 657 |
| Copper sulphate | 6,758 | 5,284 | D. 1,474 |
| Mixed sulphates | 158 | 129 | D. 29 |
| Zinc sulphate | 6,092 | 5,145 | D. 947 |
| Nickel sulphate | 187 | 189 | I. 2 |
| Metallic pigments | 4,363 | 4,469 | I. 106 |
| Miscellaneous products | 6,367 | 6,369 | I. 2 |

The production of sulphur was 178 tons in 1906, and 176 in 1907. The sulphuric acid made in 1906 was 1,335,128 tons; in 1907 it was 1,380,016 tons, 1,255,421 tons being ordinary acid, and 124,585 tons concentrated acid.

### Potash and Other Salts

The mining report gives the following statement of crude salts taken out, in metric tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Rock salt | 1,235,041 | 1,285,137 | I. 50,096 |
| Kainite | 2,720,594 | 2,624,412 | D. 96,182 |
| Other potash salts | 2,821,073 | 3,124,955 | I. 303,882 |
| Kieserite, etc | 7,356 | 2,252 | D. 5,104 |
| Boracite | 161 | 114 | D. 47 |

The statement of prepared salts marketed is as follows, also in metric tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Cooking salt | 635,171 | 665,552 | I. 30,381 |
| Potassium chloride | 403,387 | 473,138 | I. 69,751 |
| Magnesium chloride | 38,468 | 32,891 | D. 5,577 |
| Glauber salt | 81,175 | 80,347 | D. 828 |
| Potassium sulphate | 54,490 | 60,292 | I. 5,802 |
| Pot.-magnesium sulph. | 35,211 | 33,368 | D. 1,843 |
| Magnesium sulphate | 42,041 | 41,105 | D. 936 |
| Aluminum sulphate | 55,969 | 59,473 | I. 3,504 |
| Alum | 4,494 | 4,209 | D. 285 |

Potash salts show fair increases; other salts were nearly stationary, or decreased slightly.

Graphite mined was 4055 tons in 1906, and 4033 in 1907; a decrease of 22 tons only.

## Calumet & Arizona Mining Company

The annual report of the Calumet & Arizona Mining Company, for the year ended Dec. 31, 1907, shows the results of operations in the five years of its productive career:

RESULTS OF FIVE YEARS' OPERATIONS, CALUMET & ARIZONA MINING COMPANY.

| Year. | Net Earnings. | Lb. Copper Produced. | Price Received. | Gold and Silver Value. | Gross Product. | Cost Per Lb. |
|---|---|---|---|---|---|---|
| 1903 | $1,341,474 | 25,535,857 | 11.558c. | $144,862 | $3,096,807 | 6.89c. |
| 1904 | 1,682,518 | 31,638,660 | 12.562c. | 195,926 | 4,170,374 | 7.86c. |
| 1905 | 2,314,268 | 31,772,896 | 14.932c. | 178,843 | 4,923,172 | 8.21c. |
| 1906 | 4,827,872 | 37,470,284 | 17.96c. | 238,464 | 6,968,127 | 5.71c. |
| 1907 | 2,114,047 | 30,689,448 | 18.102c. | 210,846 | 5,765,636 | 11.22c. |

In every year the item of cost per pound includes all construction and development, the addition of machinery, etc., but for the year 1906 there was spent $374,357 in the development and partial purchase of additional and separated properties, and this is not included in the cost of producing copper.

The great increase in the cost per pound for 1907 is due to the strike in the early part of the year, when the company was fighting the Western Federation of Miners; to the decline in production; the increase of wages; to the fact that during a curtailment of 50 per cent. in production nearly all employees were retained; to a diminution of the copper content from 7.95 per cent. in 1906 to 5.85 per cent. in 1907; and somewhat to large expenditures for additional smelter capacity and additional automatic bin and charging arrangements.

The company has now paid 18 dividends amounting to $9,500,000, the first having been in December, 1903. There is a blast-furnace capacity of about 2000 tons of ore daily.

## Mining at Tombstone, Arizona

SPECIAL CORRESPONDENCE

The winze in the copper ore encountered last fall about 20 ft. below the 900-ft. level of the Emerald mine, Tombstone, Arizona, was sunk to a total depth of 93 ft., the winze being all in ore from the point encountered until water was met at the depth indicated. Farther along the 900-ft. level another body of copper ore was found similar to that opened up in the winze. These orebodies, however, have been left practically as discovered, for the reason that to mine properly the copper ore exposed in the Emerald workings will necessitate building a railroad a mile and a half long from the Emerald shaft to the 40-stamp mill.

It has been decided to construct another shaft in the immediate vicinity, that is, on the Silver Plume, which will not only give proper ventilation in the Emerald mine, but will also facilitate hoisting and handling the ore. No effort has been made to hasten the development of the copper orebodies encountered at Tombstone for the reason that the new smelting plant at Sasco, owned by the Imperial Copper Company (a subsidiary of the Development Company of America), has not up to the present time had sufficient capacity to handle the output of the Imperial mine. The initial capacity was 300 tons a day, but the smelter has been handling about 375 tons of charge a day. An additional unit doubling this output has been ordered, and should be in operation by the middle of June, or at the latest July 1. In the meantime, satisfactory railroad rates from Tombstone to Sasco have been established, which will permit the economical handling of the copper and other ores of the Tombstone mines.

The water in the mines has further decreased; at present about 4,300,000 gal. a day is the quantity handled by the pumps. Two additional Corliss cross-compound pumps on the 1000-ft. level should be in operation in less than 60 days. With these pumps the total pumping capacity will be 10,000,000 gal. daily, or considerable more than sufficient to handle any quantity of water that is likely to be encountered.

In addition to the development of the copper deposit some rather remarkable lead-silver-gold ore has recently been been opened up in the Emerald. The body is now exposed on two or three different levels. Assays from the ore indicate a gross value of $72 à ton. This ore is shipped directly to the El Paso smelter, and its development has made, and is making, a considerable increase in the present production of the mines.

The objective point of the operation at Tombstone is on the 1000-ft. level, where, as soon as the additional pumps are installed, crosscutting will be begun for the Contention dike in contact with the limestone about 400 to 500 ft. west of the pump shaft. A large body of leached ore has been found on the 800-ft. level east of the pump shaft, and to get below the oxidized belt crosscutting for this ore east from the 1000-ft level has been begun. Outside of the Emerald little development work has been done during the past three or four months, except in the pump shaft, where at present all efforts are concentrated to reach ground where it is believed bonanza ore will be found.

## Spring Meeting of the Appalachian Engineering Association

The spring meeting of the Appalachian Engineering Association was held in the assembly room of Skinner's Tavern, Fairmont, W. Va., on the afternoon and evening of May 2. The convention was well attended, especially by the officers, superintendents and engineers of the Fairmont Coal Company and other mining concerns in the West Virginia field. The following papers were submitted and discussed:

1. "Electrification of Steam Railroads," by Prof. Wm. E. Dickinson, West Virginia University.

2. "Upper Freeport Coal Bed in Monongalia and Preston Counties, West Virginia," by Vice-president Ray V. Hennen, Asst. State Geologist, Morgantown, W. Va.

3. "Relation of the Locating Engineer to a Modern Low-Grade Trunk Line," by Asst. Engineer G. D. Brooke, Baltimore & Ohio Railroad, Morgantown, W. Va.

4. "Practical Phases of Centrifugal Mine Pumps," by Supt. O. K. Baker, United States Portland Cement Company, Hays, Kan. (Read by G. B. Hartley, Morgantown, W. Va.)

5. "Electrical Distribution in Shops from Central Power Stations," by Prof. C. R. Jones, West Virginia University.

6. "Common Faults in Concrete Construction," by President A. Wagner. (Read by title, and to be published.)

7. "The Failure of a Concrete Bridge and the Action of the Embankment Abutting it," by H. S. Mooreland, resident railroad engineer, Clyde, N. Y.

Interesting discussions by those present followed the reading of the various papers. One of the questions debated was with reference to the forming of new mining societies in the State; the concensus of opinion favored the consolidation of such prospective organizations into one strong engineering association. The assembly was closed with an address by Ex-Governor Fleming, of the Fairmont Coal Company. Governor Fleming's remarks dealt with the coal industry of West Virginia when in its early infancy and told of the great economy that was necessarily practiced by the pioneer operators. The date and place for holding the next meeting of the Appalachian Association was left to the discretion of the executive committee.

The officers of the association are: A. Wagner, president, Newport News, Va.; Ray V. Hennen, vice-president, Morgantown, W. Va.; Dr. Henry M. Payne, secretary, Morgantown, W. Va., and R. H. Buchanan, treasurer, Edgarton, W. Va.

Recent shipments of phosphate rock from the South indicate an improvement in the industry as compared with last year.

## Personal

**Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.**

John H. Kemp is preparing plans to remodel the Bailey mill at Eldora, Colo., into a cyanide plant.

Robert T. Hill, of Hill & Irvine, has gone to the Pacific Coast on professional business, which will occupy him for about a month.

A. W. McCune is in Salt Lake attending to business matters, prior to his departure to the Cerro de Pasco mine in Peru, South America.

Henry P. Lowe, of Denver, has returned after a visit of several months in England, where he has interested British capital in Gilpin county mines.

Otto Sussman has transferred his Western office from Salt Lake City to the Empire building, Denver, Colo. His New York office remains as before.

Marshall D. Draper, of Denver, Colo., has been appointed superintendent of the Fifty Gold Mines Corporation at Black Hawk, Gilpin county, Colorado.

J. Dix Fraser, of Pictou, N. S., who has been appointed general manager of the Atikokan Iron Company, has gone to Port Arthur, Ont., to take charge of the plant.

C. A. Heberlein has severed his connection with the Compañia Metalurgica de Torreon, and will be for some time engaged in metallurgical work at Zacatecas, Mexico.

W. C. Mitchell, metallurgical engineer of the Dominion Steel Company, Sydney, N. S., has been inspecting several mines in Alabama, and the steel works at Ensley in that State.

A. D. Eatherly, recently at Martinsburg, W. Va., has been appointed superintendent of the Clear Creek Coal and Lumber Company, at Isoline, Cumberland county, Tennessee.

Walter Harvey Weed, mining geologist, 42 Broadway, New York, has returned from Mexico where he has been engaged on professional business during the last three months.

Joseph L. Danziger has gone to Hancock, Mich., where he will renew the work —temporarily suspended a few months ago—for the recovery of copper from the tailings of the Quincy mill.

Benjamin Talbot, of Middlesbrough, England, inventor of the continuous open-hearth process, will be the recipient of the Bessemer gold medal at the Iron and Steel Institute meeting on May 14.

H. M. Shepard, manager of the International Mining Company, Robinson, Colo., has been examining mines in Gilpin county, Colo., as consulting engineer, in the interests of Eastern people.

Carl Scholz, of Chicago, president of the Rock Island Coal Company, and mining expert for the Rock Island-Frisco Railroad system, arrived in Birmingham, Ala., on April 27, on business connected with his companies.

G. M. Gouyard has been appointed consulting engineer of the Mexican Exploration and Mining Company. Mr. Gouyard has just returned to New York from Mexico, where he has been for two months engaged in professional work.

William E. Dodds, for many years with the Edward P. Allis Company, and later the head of the engine department at the Allis-Chalmers plant, has been elected general manager of the Standard Cast Iron Pipe and foundry Company, Philadelphia.

Henry M. Adkinson has resigned the management of the New England Gold and Copper Company, at Bingham, Utah, to become a member of the engineering staff of A. E. Reynolds, a Denver mining operator. His headquarters will be in Denver hereafter.

Dr. Ellsworth, Dominion geologist, of Ottawa, and R. de B. Corriveau, district engineer, Canadian Public Works Department, are investigating the cause of the recent landslide at Notre Dame de la Salette, near Buckingham, P. Q., by which 33 lives were lost.

Dr. E. R. Buckley, who has just retired from the position of State Geologist of Missouri, has accepted the position of mining geologist for the Federal Lead Company, operating in southeastern Missouri. Dr. Buckley resigned his previous position in order to accept this new one.

Edwin C. Holden has retired from the firm of Hill, Holden & Irvine, mining geologists and mining engineers, of New York, in order to accept the professorship of mining engineering in the University of Wisconsin, Madison, Wis. The firm will continue under the name of Hill & Irvine.

## Obituary

Walter S. Sheafer died at Pottsville, Penn., May 2, aged 69 years. He was prominent as a mining engineer in the development of the anthracite region, and had had experience in opening coal mines in other States and in Mexico. For some years past he had managed the coal lands of the Sheafer estate.

## Societies and Technical Schools

*American Institute of Chemical Engineers*—The following circular letter has been issued under date of May 4: "The committee appointed at Atlantic City last June to consider the formation of an American Institute of Chemical Engineers has found after obtaining the views of the chemists of this country that there is a strong sentiment for bringing together into closer relationship those men who specialize more particularly in chemical engineering. A very decisive vote has been received in favor of the formation of the society. It has been decided to call a meeting for the purpose of organization. This will be held in Philadelphia some time about the middle of June. Several men eminent in the profession have consented to address the meeting."

Wliliam Miller Booth, Dillaye building, Syracuse, N. Y., is secretary of the committee.

## Construction News

*Pine Creek District, Colorado*—The Boston-Occidental Mining Company intends to install an air compressor at its mines. C. S. Ripley, Apex, Colo., is manager.

*Georgetown, Colorado*—It is reported that the Capital Mining and Milling Company will add another 100-ton unit to its mill. W. M. Cooper, Georgetown, Colo., is manager.

*Russell Gulch, Colorado*—The Slide Mining Company is preparing to put in a hoist and other machinery. M. A. Harris, Russel Gulch, Gilpin county, Colo., is manager.

*Black Hawk, Colorado*—The Fifty Gold Mines Corporation is preparing to enlarge its mill and put in a roasting furnace plant. O. B. Thompson, Black Hawk, Colo., is manager.

*Idaho Springs, Colorado*—It is reported that the Stanley Mines Company is planning to build a new concentrating mill, to treat 100 tons of ore daily. J. Brownlee, Idaho Springs, Colo., is manager.

*Silver Creek, Colorado*—The Sherman & Macon Mining Company is arranging to put in an air compressor and drills on its claims. F. L. Branham, Central City, Colo., is local representative of the company.

*Middlesboro, Kentucky*—The Ralston Coal Company is arranging to put in a new mining plant and to open mines on tract of 1000 acres, which it has leased on Stony fork, near Middlesboro. The address of the company is at Middlesboro.

*Knox County, Kentucky*—A lease of 300 acres of coal land on the line of the new Cumberland railroad has been made to a syndicate, which purposes opening a mine and putting in a mining plant. John G. Matthews, Barboursville, Ky., is at the head of the enterprise.

*Pioche, Nevada*—Recent developments in the Prince Consolidated and Ohio-Kentucky mines at Pioche, have been of such a character that the management has decided to order larger compressor and hoisting plants. A. H. Godbe, Salt Lake City, Utah, is general manager of both mines.

# Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Goldfield, Salt Lake City, San Francisco, Denver and Indianapolis

## REVIEWS OF IMPORTANT EVENTS

### San Francisco

*April* 30—The news of the bonding of the Champion Mining Company's extensive properties at Nevada City to English capitalists is the most interesting of the week. The group includes the Champion, Home, Providence, Merrifield, Wyoming, Nevada City, Spanish and several others, the combined yield of which since first opened has been about $20,000,000. There are several hundred acres of mineral land involved in the deal, which is one of the largest carried on in the country in several years. The expert examination is being carried on by John Ross, Jr., long connected with the Wildman-Mahoney properties at Sutter Creek, Amador county. The Consolidated St. Gothard, including the Delhi, at Columbia Hill, also belongs in the Champion group. The cause of the sale is the inability of the present owners of the Champion to raise the money to put the properties in suitable producing shape. The company has been involved in expensive litigation with the Home company, and while it was successful in the decision, yet its resources were heavily drawn upon. It is expected that the holders of the bond will expend several hundred thousand dollars in putting the mines in productive shape.

The rich strike in the Solano Wonder mine at Brownsville, Yuba county, recently announced, has again attracted some attention to that quartz-mining section. The ore was found at shallow depth. Lang & Reams, the locators, supposed they were on vacant Government land, but now J. C. Campbell avers that the find is on ground which he has owned for a long time. He has accordingly served papers on the locators enjoining them from working the claim. They supposed they had a vacant 40-acre claim.

While it is impossible to ascertain exactly the amount taken from the recently found pocket in the O'Hara mine, near Sonora, Tuolumne county, it is known to be upward of $250,000. Some of the miners in that region consider that the output even exceeds the biggest find made in the Old Bonanza mine, of Sonora, where they got out over $400,000 from one of the pockets. The region named is a famous one for large pockets in the quartz lodes.

What has always been considered the richest silver mine in the desert region, owned by George Riggs and wife, near the gateway to Death Valley, has finally been leased to Eastern people who will now develop it systematically. This has been known as the "mysterious mine," and the highest grade of silver ore has been shipped from it each winter. No outsiders have been permitted to enter the mine, and it has only been worked in a small way by its owner.

The long-standing differences of the Carson Hill Mining Company and the Morgan Mining Company, at Carson Hill, Calaveras county, have apparently been settled at last, after about 30 years of litigation and quarrels. The difficulties between the Jas. G. Fair heirs and Wm. Irvine have been long continued. An agreement has now been filed, with numerous conditions, by which certain moneys are to be paid by the Morgan company and then it enters into certain concessions and can go to work at once. The mine is to be opened immediately, ore extracted and milled and everything to go on.

The old Stillwagon mine, in El Dorado county, at one time a famous producer, has of late experienced difficulty in getting value out of the ores. The proprietors are now about to try the cyanide process and change the entire system of handling the ores.

It is understood that the St. John quicksilver mine, the only one in Solano county, managed by Alf Tredgidgo, an ex-president of the California Miners' Association, has at last struck a vein of good paying ore.

The Blue Lead Mining Company has recently incorporated at Bangor, Butte county, to work a channel at that place which has been worked intermittently for years, but was at last abandoned. The mine was not given up because there was not enough gold, but because the water filled up everything in spite of the pumps. Finally a tunnel has been run to drain the property and in running this, gold has been met in the gravel at 800 ft. from the entrance. About 300 ft. more must be run to reach the channel sought. P. M. Selby is president and E. E. Cox secretary of the new company, which has offices in the Monadnock building in San Francisco.

Since last week a considerable quantity of snow has fallen in the high Sierra, which means much for the water supply to come later in the season. Before this snowfall there was left but 26 in. at Summit, compared with 200 in. at the same time last year.

The people of Plumas county are much disappointed at the decision of the Rush Creek Placer Mining Company to quit the working of the mine by hydraulic process. The recent decision of the State Supreme Court that any one can enjoin a hydraulic mine, notwithstanding the issue of a permit by the California Debris Commission, was the cause of stopping work. The company will now install electric pumps and try to make a profit by drifting the property.

### Goldfield, Nev.

*April* 27—The Little Florence lease expired on April 26, but this, one of the most famous if not the most productive enterprises, will not soon drop from sight, for much important litigation is pending. The parent company by permission of the court has filed an amended complaint praying that the damages asked for be increased to $125,000 on the ground that since filing the original document it has discovered that its property has been damaged to a greater extent than at first supposed. Work on the lease has stopped and the miners have been paid, but the lease has not received payment for its recent shipments, the money being held by the parent company.

A four-horse team loaded with three and a half tons of almost pure sulphur came into Goldfield this week from Cuprite, about 17 miles south of here. The load caused considerable interest on Main street, and several hundred pounds were taken away as specimens. The sulphur was a trial shipment to the Chlorination mill, which expects to procure all its sulphur from this deposit in the future. The owner of the deposits is probably somewhat too optimistic, to say the least, when he states that he has millions of tons of pure sulphur and is ready to supply the world.

Sensational charges were filed this week against T. B. Rickey, president, and his associates of the State Bank and Trust Company, which suspended business on October 23. Since that time the management has been assuring the depositors and reorganization committees that dollar for dollar would be paid and that the bank would soon resume. But it appears that during the time that the bank has been closed it has been looted, and there is no doubt now that the bank is insolvent. A receiver has been asked for and the State bank examiner has charge of the bank and its branches in Carson City, Reno, and Goldfield pending the action of the court. Rickey is under indictment for embezzlement of the bank's funds.

Charles G. Gates, of New York was in Goldfield this week *en route* from Rawhide to Pasadena, where he will remain for several weeks.

## Salt Lake City

*May* 1—A consolidation of the Swansea and South Swansea mines in Tintic is about to be accomplished, the control to be vested in Jesse Knight and associates, of Provo, Utah. These mines were formerly dividend-payers of considerable note, but were closed several years ago when it became necessary to depend on the ore supply below water level. The two companies could not agree on a basis wherein each would share in pumping costs, and production ceased. Two or three months ago, control of the Swansea mine passed to Mr. Knight, his prime object being to obtain a permanent water supply for the Tintic smeltery, now being constructed.

The Lucky Dutchman Mining Company, a Salt Lake corporation formed originally to develop a property in the Crescent district, Nevada, has acquired the Superior-Alta group at Alta, Utah.

The Utah Apex Mining Company, operating in Bingham, is to push a campaign of development. A contract has been let to extend the Parvenue adit. It has been run 2600 ft. and to reach the objective will be run as far again.

The Lincoln Mining Company, operating in the Pearl district, Idaho, the headquarters of which are in Salt Lake, has been placed in the hands of receivers. Application was made by David Kennedy, the manager, and other shareholders.

A new gold-mining camp, about 60 miles west of Oasis and near the Nevada-Utah State line is attracting considerable attention in Salt Lake. Little development has been done as yet, but the surface indications are favorable.

Drilling for oil in the vicinity of Juab has commenced. Several rigs have been set up and others will be up during May. A number of seepages are in evidence. Officials of the Salt Lake route are interested in developing the field.

A syndicate of Salt Lake and Eastern men is about to build an electric-power plant at Modena, Utah, to supply power to the camps of Gold Springs, Stateline, Deer Lodge and Bull Valley. Officials of the Jennie Gold Mining Company, at Gold Springs, are interested in the enterprise.

At this writing the great task of restoring the Ontario drain adit at Park City has been almost accomplished, after three years of vigorous effort and the expenditure of a great deal of money. The adit was closed by caves in March, 1905, and the flood of water which followed as a consequence of the stoppage necessitated the cessation of work in the lower levels of the mines of the Park City district. The principal producers affected were the Ontario, Daly-West, Daly, American Flag and Silver King. Preparations are under way to resume operations along the lines in vogue prior to the disaster.

## Denver

*May* 2—In the Vidler tunnel fiasco, the appraisers appointed by the bankruptcy court report the holdings of the company as worth $70,000; the property is to be sold by auction May 5. It is said that the English investors will buy in the property, and endeavor to recoup their losses by completing the tunnel through the divide, and using it in connection with the Argentine Central Railway for the transportation to Denver of the ores of Montezuma camp.

Irving Howbert, for more than three years president of the Portland Gold Mining Company, of Cripple Creek, has retired in favor of Frank G. Peck, who has resigned the secretaryship of the company to take that position. This is one of the great mines which has produced over 10 per cent. of the gross production of the camp, and has paid nearly $8,000,000 in dividends on the capitalization of $3,000,000, returning to the stockholders about 30 per cent. of the gross production of the mine. Moreover, what is worthy of record is the fact that it has been worked solely for the extraction of the gold, and the payment of dividends, without any regard to the stock market. It is reported that large, new bodies of rich ore have been discovered at the 1500-ft. level, thus disproving the correctness of the theory of many mining engineers, who predicted 1000 ft. as the average depth at which pay ore would cease to be found in the Cripple Creek district. Mr. Howbert is quoted as saying that this new vein at 1500 ft. is wider and richer than that on the level 100 ft. above it. The drainage tunnel, when completed, will drain the mine at 2200 ft. depth.

The bullion value of the output of the Cripple Creek camp for April is given at $1,334,389, for 64,000 tons handled.

Montezuma, one of the old silver-lead-zinc ore camps, has been what is termed here "rediscovered," and great preparations are being made for a heavy summer's work. Likewise the mine owners of Ouray, Silverton and Rico, in the San Juan, and of Gilpin and Clear Creek counties, are full of enthusiasm, and it appears now to be the commencement of a big year for Colorado mines.

With appropriate ceremonies, ground will be broken here tomorrow for the Denver, Laramie & Northwestern Railway, which it is intended to build by way of Ft. Collins and Laramie, Wyoming, to Seattle. The capital is to be furnished by Kansas and Nebraska investors.

## Indianapolis

*May* 4—That the new coke ovens near Linton are the first ever constructed in Indiana is denied by residents of Oakland City. Fifty-four coke ovens of the beehive type were built by the Laclede Coke Company, of St. Louis, near Oakland City, in 1886, and were operated continuously until 1904. The mine from which the coking coal was taken was at that time closed, and the coke ovens abandoned, on account of the distance from the other mines of the company to the ovens. The product of the 54 ovens when worked at full capacity was 50 tons daily, and the product was shipped to St. Louis and Omaha, where a ready sale was found.

These ovens have deteriorated to some extent, but can be repaired and used again, and the owners, who are now opening a new mine near them, are considering their renewed use.

The railroads owning coal mines and coal land in Indiana have joined in the petition with railroads in other States to the United States Senate for a suspension of the operation of the commodity clause in the railroad rate law which became effective May 1. Under the operation of this clause railroads would be liable to heavy fines if they undertook to haul in interstate commerce any articles or commodities produced from manufactories or mines in which the railroads have an interest. The railroad men contend they have had insufficient time to divest themselves of the ownership of such property interests. The petition asks that the railroads be given until January, 1910, to comply with the clause.

A call has been issued for the reassembling of the convention of Indiana miners at Terre Haute, May 5, to receive a report from the joint scale committee of operators and miners. There is little prospect of the scale committee's reaching an agreement. The joint conference began a month ago and, with the exception of the time spent in the Toledo convention, the joint committee has been in daily session, the disagreement becoming more pronounced from day to day. It is expected that there will be some sharp debates when the convention meets. The operators are not pressed by trade conditions for a settlement. The mines of the State are not being operated more than two days per week on an average. While the miners' organization is not well fixed financially for suspension, the men feel that since there is so little work they might as well be idle in a locked-horns game of freeze-out with the operators. The points of difference are more numerous than in any former joint conference, which is largely due to the spirit on both sides against conceding anything on principle. The points of contention are the docking system, the fines for spasmodic strikes, non-union powder, price of labor other than for miners, etc. On the whole, the prospect for an immediate settlement of these differences are not encouraging.

# Mining News from All Parts of the World

**New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents**

## THE CURRENT HISTORY OF MINING

### General Mining News

*United States Steel Corporation*—The directors have re-elected the former list of officers as follows: Elbert H. Gary, chairman; William E. Corey, president; James Gayley, first vice-president; William B. Dickson, second vice-president; Francis J. Filbert, comptroller.

### Arizona

A recently issued freight tariff of the Santa Fé lines in Arizona, reducing ore transportation charges from points on that line to the El Paso smelter makes reductions of from $3 to $2 a ton on ore according to the value of the ore. The new rates are as follows: In the district from Hillside, south and including Wickenburg, the new carload rates are $5.50 on $35 ore; $6 on $50 ore; $6.50 on $75 ore, and $7.50 on $100 ore. The rates from points south of Wickenburg, including the Arizona & California railroad to Parker, according to the new tariff are $7 on $35 ore; $6.50 on $50 ore; $7 on $75 ore, and $8 on $100 ore.

PIMA COUNTY

*Wilson & Gardner*—A trial shipment of silver-lead ore has been made from this property, which is situated 55 miles from Tucson.

### California

AMADOR COUNTY

*Hazard*—The developments in this mine, between the Fremont and Bunker Hill, L. R. Poundstone, superintendent, are encouraging.

CALAVERAS COUNTY

*Four Hundred*—Work is being resumed at this mine, Mountain ranch; heavy machinery is to be put in.

*Voinich*—After many months work a wide vein of $8 rock has been found in this mine; the mill is being put in running order.

EL DORADO COUNTY

*Sherman Mining Company*—This company, near Placerville, Thomas Clark, superintendent, has purchased from the abandoned River Hill Mining Company, 10 stamps of the old mill, to be added to the five stamps already on the property. The new double compartment shaft is 150 ft. down.

NAPA COUNTY

*Napa Consolidated Quicksilver Mining Company*—This company's statement for 1907 shows 18,853 tons of ore reduced and 2440 flasks quicksilver made. The average yield was 0.5 per cent. Gross earnings were $90,413; expenses, $83,902; net earnings, $6511. Adding balance from previous year, the total surplus was $24,219. The report says that prospecting was continued, generally with indifferent results. While earnings show a net result over expenses the trustees believe in continuing prospecting work.

NEVADA COUNTY

*Golden Gate*—This mine, near Grass Valley, idle for years, has been pumped out, and drifting east and west in the ledge has commenced. The mill has been started on ore from upper levels.

*Lead-Copper*—Williams, Whiting & Ryan are opening a lead-copper deposit 17 miles from Grass Valley, and are making test shipments to the smelter. A pump is being installed.

*Serius*—E. A. Work and Henry Eckhardt have bonded this mine at Washington, and will install a compressor and drilling plant and then put up a 10-stamp mill.

PLUMAS COUNTY

*North California Mining Company*—No operations have been commenced by H. H. Yard this year, though for several years past active work has been carried on mainly in the line of annual assessment work on hundreds of claims. Adverse decisions by the local land office are supposed to be the cause of the inactivity.

RIVERSIDE COUNTY

*Ivanpah Consolidated Mining Company*—This company has sold the Lizzie Bullock Nos. 1 and 2 and Alaska Nos. 1 and 2 claims to A. H. Beach, of Pasadena, California. They are silver properties.

SAN BERNARDINO COUNTY

*Dry Lake*—The Mining and Milling Company at Dry Lake, Holcomb Valley, after an idleness of several months, is about to start work again; a hoist is to be erected.

*Italie Mining Company*—The rich gold ore found near the surface of this mine in Twenty-Nine Palms district, has been tapped at 95 ft. depth.

*North Star Mines Company*—The statement for the year 1907 shows gross receipts $1,555,582; expenses, $534,496; net earnings, $1,021,086. Dividends paid were $250,000, leaving a surplus of $771,086, which is accounted for as follows: $23,450 supplies on hand; $113,390 bills receivable; $362,696 cash; $271,550 investment account.

SAN BENITO COUNTY

*New Idria Quicksilver Mining Company*—This company's statement for 1907 shows that 59,285 tons of ore were reduced, the yield being 7675 flasks quicksilver; an average of 0.486 per cent. The earnings were $284,743; expenses, $195,093; net earnings, $89,650. Dividends paid were $80,000, leaving a surplus of $9650. Adding balance from previous year the total surplus was $135,146. The report says that surface workings averaged fair during the year. Levels below No. 3 are in good ore and show an increase of ore ground as stopes are opened. No. 3 furnace was completed and fired in July, making three now in operation. Quicksilver averaged a fair price during the year.

SAN DIEGO COUNTY

*Cleveland-Pacific*—Leasers on this mine have found a thin seam of rich ore, the ore from which is being sacked for shipment. This is the second rich pocket found in this property. The mine is at Escondido.

SONOMO COUNTY

*Culver-Baer Quicksilver Mining Company*—S. G. Foster has been re-elected president of this company and Frank Baumeister, superintendent. The furnace will be started up on May 1, and preparations have been made for a long run.

STANISLAUS COUNTY

The new dredge at La Grange has been started at work with electricity as motive power.

TRINITY COUNTY

*Bullychoop*—This company, the properties which are on Bullychoop mountain on the border line of Trinity and Shasta counties, is about to resume operations after a year of idleness due to dissention among the stockholders. It is understood that there has been a radical change of management, but J. H. Thomas continues general manager. The mine is equipped with a 30-stamp mill, tramway and other modern appliances.

TUOLUMNE COUNTY

*Black Oak*—This old mine at Soulsbyville, recently bonded by S. A. Knapp, of Oakland, Cal., has been started up again, and is being unwatered. The shaft is

1300 ft. deep and the water is up to the 200 level. The ore in the old dump will be crushed in the 40-stamp mill while the mine is being unwatered.

YUBA COUNTY

*Tarr Mining Company*—This company holding the bond on the Blue Gravel Mining Company's claims (Paddy Campbell's) at Smartsville, is building flumes and making preparations to work these old hydraulic mines.

## Colorado

CLEAR CREEK COUNTY

*Continental Mines, Power and Reduction Company*—Plans are being made for the hydro-electric power plant for the Seemann tunnel. H. I. Seemann, Equitable Building, Denver, Colo., is manager.

*Golden Hope*—This group, in the Morris and Downieville districts, has been sold by the Golden Hope Mining Company to W. E. English.

GILPIN COUNTY

*Gilpin County Chamber of Commerce*—At the annual meeting C. E. Wiley, F. L. Branham and S. P. Weller were elected directors. The board elected the following officers: President, C. E. Wiley, Central City; first vice-president, T. Dunstone, Black Hawk; second vice-president, H. C. Bolsinger, Bald Mountain. The Chamber will thoroughly advertise the county through different channels and will seek to interest capital for legitimate mining. P. R. Alsdorf, Central City, Colo., is secretary.

*Bon Ton*—Eastern and Denver people are interested in starting up the Two Sisters property in Eureka district; they are installing a new boiler and pumps. Dan Munday, Central City, Colo., is manager.

*Esculapian*—Operations are being resumed with Chicago capital interested. Machinery is being installed on the Star of the West shaft. Stephen Harper, Central City, has been appointed superintendent.

*Fifty Gold Mines Corporation*—The big electric pumps made by the Sandusky Foundry and Machine Company, of Sandusky, O., equipment for which was furnished by the General Electric Company, costing about $35,000, have been installed. They are running in the Cook 1300-ft. and 1400-ft. levels. The working force has been increased and a heavy production will be made for the 80-stamp mill. The company intends to enlarge its mill as well as to build a plant for desulphurizing the ores. O. B. Thompson, Black Hawk, Colo., is manager.

*Gowers Mines Syndicate, Ltd.*—British owners, interested in the Running Lode mine at Black Hawk, have cabled to Tom Dunstone, of Black Hawk, superintendent, to start up the property again after a shut-down of about two months. Work will be furnished to about 30 men. Heavier machinery may be installed for deeper workings.

*Iroquois Mining Company*—This company has been incorporated with $50,000 capital to operate the Lorrillard and Iroquois group in Russell district with T. R. Cudahy, Central City, Colo., as manager. Chicago people are in it.

*Newhouse Tunnel*—It is current report that matters are being amicably adjusted between the Newhouse tunnel stockholders and the owners of mining properties in the Quartz hill section of this country, which will have for result the resuming of operations in the tunnel within the next few weeks. With less than one-half mile to drive, the deeper mines of the Quartz hill and Nevada districts, which have been shut down for a number of years on account of the expense of handling water, would then be able to work along economical lines as the drainage matter would be settled through the tunnel.

*Topeka*—It is reported that British capital has become interested in this property in the Russell district, and that arrangements will be made shortly for starting up work, under management of H. P. Lowe, Equitable Building, Denver.

LAKE COUNTY—LEADVILLE

*Belvidere Tunnel*—A contract has been let for driving 500 ft. of this adit in the Horseshoe district. F. L. Loomis, of Fairplay, is the contractor. L. R. Johnson, of Denver, is promoting the enterprise.

*Boston-Arizona Mill*—Arrangements are being made to start this mill, which is equipped for treating zinc ores.

*Lone Star*—Larson & Larson have taken a lease on this group, and will start work at once. The shaft is down 100 ft., but only a little development work has been done.

OURAY COUNTY

*Camp Bird, Ltd.*—During the month of March the mill ran 30 days, crushing 6992 tons of ore (dry weight), yielding 8561 oz. bullion and 354 tons concentrates. Receipts were $130,727 from bullion and $20,946 from concentrates; total, $151,673. Mine and mill expenses were $55,929, leaving a balance of $95,744. Expenditures on construction were $301; development work, 771 ft. The company has declared an interim dividend for the quarter ended April 30 of 1s. per share, payable May. 7 at the London office.

SAN JUAN COUNTY

*Hercules Consolidated*—This company's mine and mill have been started up, after several weeks' idleness. Since the closing down of the mill it has been remodeled and the capacity has been enlarged to 150 tons daily. The jigs have been overhauled, 10 new stamps have been added, making 40 stamps now in operation, new launders have been installed throughout the mill and the elevators have been improved. Four new Wilfley tables have been added making 18 now in use. A new system of settling tanks has been added.

## Idaho

NEZ PERCE COUNTY

*Idaho Company*—A Risdon dredge is now in operation and another similar machine will be brought to the ground and put in operation before the close of the season.

*Ozark Mining Company*—An adit is being driven on the Wild Rose group of claims. An eight-drill compressor has been installed, and preparations made for extended development work. In a crosscut about 100 ft. from the portal some rich gold-quartz ore was recently taken out, but work will be concentrated on driving the adit. Several small veins are thought to intervene between the present face and the main ledge.

*Tacoma Business Men's Association*—The largest pump ever brought into Orofino creek has been installed and all necessary machinery is being set up for working out the deep gravel deposits of the property.

IDAHO COUNTY

*New Gold Discovery*—Native gold struck in a 14-ft. ledge at a depth of 50 ft., 14 miles from Orogrande, on the south fork of the Clearwater river, has caused a mild stampede to the district, and many mining claims have been located in the vicinity of the property upon which the gold was found. The ore was found by John Howard and John Lackey after development lasting since last October.

*The Sacajawea Exploitation Company*—Additional equipment consisting of two giants and a line of 22-in. pipe has been installed on the property, formerly known as the Old Montana group. Preparations are being made for a six-months' run. There are extensive gravel deposits to be worked here.

SHOSHONE COUNTY

*Snowstorm*—This mine is shipping about 350 tons of ore daily to the Montana and other smelters. The Greenoughs, the principal owners, are now on a trip to Alaska viewing some copper properties, which it is their expectation to operate in connection with the Snowstorm. There are rumors current here that the Snowstorm, as well as several other large properties, are to be shut down shortly, but definite information cannot be obtained in any quarter.

*Rex*—The mill is running one shift daily. Development work in the mine is progressing and new machinery is being put in for sinking to lower levels.

*Charles Dickens*—The new mill of 200 tons capacity is soon to be running at the

property on Moon creek. The old mill was destroyed by fire in January. The company is now running a crosscut on the No. 3 level, which will tap the orebody at a depth of 575 ft. This is thought to be near at hand.

*Iron Clad Mine*—This mine, at Murray, reports copper sulphides in the face of its adit, 900 ft. from the portal. The mine has been entirely retimbered during the winter and is ready for inspection. A crew is steadily working.

*Success Mining Company*—J. Leslie Bailor, acting for the company, has obtained a bond on the Monitor mine near Saltese, Mont., a well known copper producer, and has already taken control. Of the 1,000,000 of Monitor stock, 700,000 have been placed in escrow for $150,000.

## Indiana

GIBSON COUNTY

As the result of an explosion of gas in the mine owned by the Princeton Coal Company, three miners were perhaps fatally burned and several others slightly injured. The property loss is not great.

VIGO COUNTY

Wellington O'Connor, deputy State mine inspector, brought about six prosecutions during the past week for violation of mining laws. All of the men are employed at the Hudson mine, near Farmersburg, and upon pleas of guilty were fined. One complaint was the first case of the kind under the Bland act. This was a complaint against a mine boss, who was charged with failure to keep 3 ft. space between the rail and ribs of the mine. This is the first violation the inspectors have found since the new law became effective. The other cases were against miners for drilling ahead, for opening powder cans with a pick and for tamping with drill dust.

## Michigan

IRON

During the last few weeks a number of mines in the district surrounding Iron River, Stambaugh and Spring Valley have been forced to close down owing to the lack of new business in the steel trade. Since the opening of the year about 500 men have been laid off.

*Nanimio*—This mine, in the Iron River district of the Menominee range has been closed down. The Mineral Mining Company which owns the property will keep the mine unwatered in anticipation of a resumption in a month or so. Last year 53,000 tons of ore was shipped.

*Pewabic*—A new hoist is being installed at No. 1 shaft of this mine in Iron Mountain and the shaft is being retimbered. Both Nos. 1 and 2 shafts have been sunk another level and the new steel shaft house at No. 2 is now practically complete.

*Republic*—Recently 100 men were laid off; the force now consists of about 400 men. Four shifts per week are being worked and there is a larger tonnage in stock than usual.

*American*—M. A. Hanna & Co. are reopening this old mine, west of Ishpeming on the Marquette range. Stoping has begun.

*Blue*—The Steel corporation has taken back 125 men who were laid off two months ago and a force of 225 men are now employed at this mine at Negaunee on the Marquette range.

*Smith*—The Cleveland-Cliffs company has awarded the contract to sink two shafts east of this mine in the Swanzy district to the Foundation Company of New York. These shafts will be similar to the one already sunk by the Foundation Company at the Smith mine.

*South Mastodon*—This old property, in the southern part of the Crystal Falls district, Menominee range, has been taken over by the Steel corporation and will be prospected by diamond drilling.

## Montana

BUTTE DISTRICT

*Burke & Ballaklava*—This company, operating the Burke and Ballaklava claims, situated north of the Colusa of the Boston & Montana Company, has sunk its shaft to a depth of 700 ft. A crosscut was driven on the 500 and the vein intersected, showing 5 ft. of commercial ore. A station has been cut on the 700 and a crosscut is being driven to the same vein which was cut on the 500.

*Raven*—An incline depth of 1130 ft. has been reached. A station has been cut on the 1100 and a crosscut is being driven to intersect the vein, which it is expected will be cut within 100 ft. Four sets of leasers are working with good results on the silver ores of the upper levels. The Raven was formerly worked through the Buffalo shaft of the Amalgamated company.

*Washoe Smelter*—The smelter of the Amalgamated Copper Company is operating at full capacity, and is said to be reducing more copper than at any time in its history.

*Pittsburg & Montana*—The smelter is in operation and 125 tons of the high-grade ores are being treated daily. A 300-ton concentrator is now being erected for the treatment of the second-class ores.

*North Butte Extension*—The shaft has reached a depth of 550 ft., a station has been cut on the 500 and pumps installed. A crosscut was driven on the 300, showing a well defined vein, slightly mineralized. Sinking will be continued to the 700, where another crosscut will be driven.

*British Butte*—The shaft has been sunk to a depth of 850 ft., and bedrock has not been reached. Several strata of volcanic ash have been cut in the shaft, and the entire material extracted is gold bearing. Preparations are now being made for the installation of a dredge, and the water pumped from the shaft will be used for dredging purposes.

*Butte & Superior*—A depth of 1050 ft. has been reached in the shaft, a station cut at the 1000 and pumps installed. Sinking is now in progress and will continue to the 1200, where a crosscut will be driven to the vein.

## Nevada

ESMERALDA COUNTY—GOLDFIELD

The activity in Goldfield is daily growing more marked and many of the old idle leases are being started up.

*Ore Production*—During the week ending April 25 the Western Ore Purchasing Company received 687 tons, segregated as follows: Wingfield dump on the Florence, 187 tons; Combination Fraction, 123 tons; Rogers-Syndicate lease, 158 tons; Great Bend, 25 tons; Little Florence, 95 tons; Daisy, 47 tons; Diamondfield Black Butte, 18 tons; Great Western, 34 tons; total valuation estimated $68,700. The Combination mill ran to capacity, 95 tons daily. The average value of the ore was $35, making the week's clean-up $23,975. The Nevada Goldfield Reduction Works handled 568 tons, as follows: New Fuller dump on Jumbo, 312 tons; Begole Syndicate, 250 tons; Higginson Mining and Leasing, 6 tons; total value for week, $35,900.

*C. O. D. Consolidated Mining Company*—This corporation has been formed by combining the C. O. D., Gold Bar and Victor mining companies. The directors of the new company are the same as those of the C. O. D. and the Gold Bar companies, with the exception that J. H. McKenzie will be the one new director. Louis K. Kountz will be general manager of the new company, and the product of all three mines will be treated at the new mill of the Goldfield Consolidated Mines Company. The merger will eliminate all possibility of apex suits.

*Goldfield Consolidated*—The crosscut, driven from the vertical shaft at the 600-ft. level of the Mohawk mine has cut the vein about 200 ft. distant and has penetrated it 7 ft. Assays show $75 per ton at this point, and a winze, sunk on the vein from the 450-ft. level, shows similar quantities of gold. The strike is important because it adds a block of ore 1200x238x30 ft. to the known orebodies. An important strike is also reported on the Laguna claim at a point northeast of the working shaft of the Red Top.

*Kendall*—The Garrett lease is still showing up well and it and the new leases on the Sandstorm have brought much renewed interest in the portion of the camp in which the first location was originally made and from which Goldfield's first ore was produced.

*Gem*—This company has resumed work on its lease on the Cornishman claim, part of the Florence property. The Gem's legal difficulties are settled for the time being at least, and three shifts are pushing after the ledge.

*Gold Bar*—A lease on this property starts work this week. When work stopped last fall the shaft was 400 ft. deep. Sinking will be begun at once, and it is the intention to sink to the 600-ft. level before doing any more lateral work.

*Velvet*—The Goldfield Velvet Consolidated Leasing Company has begun to sink its shaft from the 400- to the 500-ft. level.

*Florence Consolidated*—This mine has entered the shipping class and is breaking a full face of ore running about $75 per ton.

*Kewanas*—The new electric pump has arrived and is being installed.

*Lazy George*—This week the Waterson lease on this claim will begin the work preliminary to renewing its suspended operations. The Lazy George claim, is owned by the Lone Star Mining Company, and lies east of the Velvet and north of the Blue Bull. The lease has a shaft 200 ft. deep and has 250 ft. of lateral work.

*Laguna*—The Mushet lease has made a rich strike. Assays from the new vein run from $170 to $900 per ton. The size of the vein has not been determined, but the management is confident of 4 ft. of shipping ore.

*Rogers Syndicate*—This company which is operating the lease adjoining the Little Florence, has declared a second 5-per cent. dividend of $50,000, payable May 15. This makes $100,000 paid by the lease.

*White Rock*—The January White Rock Mining Company, which is now controlled by Samuel Newhouse, has retimbered the shaft on its lease on this claim and is ready to operate.

NYE COUNTY—BULLFROG

*Gold Bar*—Work on this property has been suspended, pending the installation of additional equipment. Plans for improvements include a cyanide annex and a new pipe line.

*Gold Bullfrog*—A 10-stamp mill, it is reported, will replace the present equipment, which gives unsatisfactory extraction.

NYE COUNTY—TONOPAH

*Ore Production*—The total output of the Tonopah mines for the week ending April 25 was 6100 tons, of an estimated value of $127,600. Shipments over the Tonopah & Goldfield Railroad to the Western Ore Purchasing Company consisted of 140 tons from the Tonopah Extension. The Tonopah company sent 3450 tons, the Belmont 670 tons, the Montana-Tonopah 1100 tons, the Jim Butler 240 tons; the Midway 350 tons, and the MacNamara 150 tons to the mills.

*Midway*—The north crosscut from the west drift on the body of quartz on the 835-ft. level has apparently struck the hanging wall, after passing through 70 ft. of quartz. In the stopes between the 300- and 400-ft. levels on the Brougher vein about 2 ft. of good ore is being taken out.

*Montana-Tonopah*—The 40-stamp mill broke all records during the week ending April 25 for extraction, an average of 92½ per cent. being recovered. An average of 1100 tons a week is treated by the mill. The grade of the ore, treated is gradually raised, owing to the increased quantity of rich ore found in recent developments in the mine. None is shipped, the richer portions being mixed with poorer ore. A total of 184 ft. of new work was done during the week.

*Tonopah*—The blowing out of the high-pressure cylinder of the big compressor has stopped all development work in the mine. Repairs will take about two weeks. Work in the stopes is going on as usual. It is planned to resume the use of the diamond drill, this time in the Red Plume shaft. The Mizpah shaft will be sent down another 400 ft. to 1300 ft. depth.

*Tonopah-Belmont*—About 250 ft. of new ground was broken during the week ending April 25, most of the work being done south of the main east shaft. Several good bodies of ore were found, as well as a number of stringers.

WHITE PINE COUNTY

*Nevada Consolidated*—The Steptoe plant has fairly begun operations. On April 12 two of the engines in the power house were set in motion and a test of the crushers was made. On April 16 water was turned on the tables of the first unit of the concentrating plant and on April 19 a trial run was made. On April 13 the first standard train made a run from Copper Flat to the mill. Two locomotives for use on the railroad have been shipped, and these will be followed by two others; 100 steel cars of 50 tons capacity each will be ready for delivery June 1. Three steam shovels are at work on the Copper Flat property, and the Star Pointer shaft is ready to ship at a moment's notice. The new four-compartment shaft at the Cumberland-Ely has made connection with the old drifts and is prepared to hoist ore as soon as the Steptoe plant is ready to furnish the necessary power. The concentrator is built in three units of 1300 tons capacity each; these will begin work on ore as rapidly as they can be completed. The entire plant should be in operation early in the summer.

## New Mexico

DONNA ANA COUNTY

*Las Cruces Copper Company*—This company plans to build a smelter at its mines at Las Cruces before summer.

MCKINLEY COUNTY

*Southwestern Oil Company*—This company has been organized to develop a tract of oil lands consisting of 17 oil claims, 15 of which are full quarter sections, the other two being respectively 80 and 40 acres. The land is situated about 18 miles from Gallup, and lies within eight miles of the Santa Fé Railroad.

## Ohio

ATHENS COUNTY

*New York Coal Company*—This company, of which E. M. Poston is president, has awarded a contract for the erection of a Stewart coal breaker and washer to be erected at Mine 31, near Buchtel. The washer will also treat the coal from mines 32 and 33. The breaker and washer will cost about $70,000. It is the intention of the company to break and wash all coal below the grade of lump. The capacity of the breaker and washer will be 1000 tons daily.

JEFFERSON COUNTY

The old Hull Bank coal mine near Steubenville, which has been closed for a number of years on account of a fire, is to be reopened. A new entry has been made and the area of the fire circumscribed, so that it will burn itself out soon.

WAYNE COUNTY

*Porter Coal Mine*—This mine, near Doylestown, has been closed, the coal area having been worked out. The last work done was taking out the pillars. The mine has been a large producer.

## Pennsylvania

BITUMINOUS COAL

*Diamond Coal Company*—This company has bought 500 acres of coal land near Brownsville, and will at once begin work opening a mine. P. M. Pfeil, of Pittsburg, is president of the company.

*Pittsburg Coal Company*—This company is clearing the old Port Royal mine of water and gases preparatory to starting up the Euclid shaft mines adjoining, which have been shut down since the Darr mine explosion last December. Owing to the proximity of the Euclid shaft to the old Port Royal mines, which are very gaseous, it was deemed advisable to preclude all possible danger from explosions or floods. Holes have been drilled and compressed-air pumps are being used to force out the water. As soon as the old mines are cleared, operations in the Euclid shaft mines will be resumed.

*Springfield Syndicate*—A deal was made April 20, between Charles W. Stuart and A. P. Strittmayer, of Hastings, and Horace A. Tompkins, of Ebensburg, whereby Mr. Tompkins becomes the owner of a lease of 700 acres of the Springfield Syndicate lands owned by

Ebensburg people, and operated under a lease held by Stuart & Strittmayer. Mr. Tompkins purchased the lease and equipment of the mine, which opens near Nant-y Glo. The mine equipment is of the best, electric haulage being used. The deal does not include the land, as the mine is operated on a royalty basis. The consideration has not been made public. Mr. Tompkins intends to operate the mine on an extensive scale.

COKE

*Bessemer Coke Company*—This company has bought a tract of 1105 acres of coking coal in Greene county from J. V. Thompson, of Uniontown, for $800,000. The property is to be connected with the Monongahela division of the Pennsylvania road, and development will be started where the tracks are laid.

*Dunn-Connellsville Coke Company*—This new company is building 50 coke ovens on its property at Eisaman, on the Baltimore & Ohio road, near Connellsville. At a recent meeting the following officers were elected: President, Paul Mauzey, Brownsville; first vice-president, A. J. Stough, Greensboro; second vice-president, S. F. Tannehill, Connellsville; treasurer, Dr. L. C. Waggoner, Brownsville; secretary, C. H. Blakeney, Brownsvills.

*H. C. Frick Coke Company*—This company is preparing to let contracts for a large plant on the Hogsett tract of coal-land below New Salem, near the company's Buffington plant. The coal shaft will be 150 ft. deep, and will have steel head-frame and tipple. The coke plant will have 600 bee-hive ovens.

*Pickands-Magee Coke Company*—This Pittsburg company will add to its present coke operations a 40-oven plant, on the Sewickley branch of the Pennsylvania Railroad. This plant adjoins the Mammoth and Calumet properties of the H. C. Frick Coke Company, in the old Connellsville basin. The company will operate it as the Magee Coke Company and will produce high-grade foundry coke. Shipments will be commenced early in May.

## South Dakota

LAWRENCE COUNTY

*Burch Ground*—This claim has been sold to Eastern parties. The new owners are expected to commence operations shortly. The ground is at Custer Peak.

*Esmeralda*—A portion of the property has been leased to Flow & Shannon, of Central City, while the owner, Emil Faust, is negotiating for the sale to Eastern parties.

*Fassold*—The ground is being developed and put in condition to ship ore some time this summer. Several good shoots of ore have been opened up.

*Hanson*—A substantial strike of gold ore has been made on the Gentle Annie claim on Squaw creek by the lessees. It is being opened up for shipping.

PENNINGTON COUNTY

*Black Hills Anaconda*—The main shaft is down 125 ft. on a wide ledge of free-milling ore.

*Joe Dollar*—High-grade ore is being developed on the property near Hill City and is being taken out for treatment. It will probably be shipped.

*Montana*—It is expected that a new and larger mill will be ordered soon to handle some new ground just purchased at Rochford.

*Minnesota*—New York parties have taken a bond and will operate this ground as well as their placer holdings along Castle Creek.

*Montezuma*—Good ledges are being opened up in the preliminary work before actively resuming the summer development of the property. The owners are going ahead regardless of the option that an English company has on the property.

*Schnee*—A one-stamp prospecting mill has been installed. Tests of the free-milling ore will be made and if practicable, a larger mill will be erected within a few months. The property is situated near Hill City.

*Standby*—It is announced by J. B. Baker that this old property in the Rochford district will resume as soon as the requisite repairs can be made. There is much ore exposed, and the mill can be put in shape with but little effort.

## Tennessee

CUMBERLAND COUNTY

*Clear Creek Coal and Lumber Company*—This company has purchased and taken possession of the property of the Clear Creek Coal Company, including 6500 acres of coal and lumber land. The new company has $1,000,000 capital, all owned by Ohio parties. Several sawmills have been started and a second coal mine is to be opened. W. V. Smith, Columbus, Ohio, is president; A. D. Eatherly, Isoline, Tenn., superintendent.

PUTNAM COUNTY

*Georgia-Tennessee Phosphate Company*—This company is opening a phosphate mine about three miles from Baxter, in a field heretofore undeveloped. The company expects to erect fertilizer works in the near future.

## Texas

JACK COUNTY

*Lost Valley Coal Company*—This company has been incorporated to develop coal lands on the line of the Dallas & New Mexico railroad, now under construction. The capital stock is $250,000. The incorporators include T. D. Spencer and E. W. Nicholson, of Jacksboro, and J. W. Pinson, of Dallas, Texas.

## Utah

TOOELE COUNTY

*Consolidated Mercur*—The new shaft in Golden Gate ground has been connected with the Brickyard tunnel. It is now possible to draw liberally from the ore deposits of the Golden Gate mine.

SALT LAKE COUNTY

*Tintic Smelting Company*—It is expected that the lead-smelting department of this company at Silver City will go into operation in June, and the copper department in July.

SUMMIT COUNTY

*Park City District*—The mines of Park City are drained again down to within 50 ft. of the Ontario drain adit level and the Ontario management expects that the adit will have been restored within the next 10 days. The restoration will mean a revival of mining in Park City in general, and already preparations are being made to resume production in the Ontario and Daly mines. The Daly-West company awaits the opening of the adit before starting up again along vigorous lines; but then the project of continuing the drain adit level into Daly-West orebodies will be taken up and carried out along the lines planned prior to the stoppage of the adit by caves three years ago. The Silver King Consolidated is about to resume development; while the American Flag company will continue its workings to the deep levels, which owing to water, it has not been permitted to do.

WASHINGTON COUNTY

Increased interest is being shown in the Bull Valley district located in the extreme northwestern part of Washington county, where some sensational gold discoveries were recently made. The mineral belt is believed to be a continuation of the one cutting through Gold Springs and Deer Lodge more than 20 miles away.

## Washington

LEWIS COUNTY

A tract of 600 acres of coal land between Centralia and Gray's Harbor has been bought by parties from Los Angeles, Cal., represented by J. G. Fitch as agent, and D. Van Wagenen as engineer. They intend to open a mine and develop the land on a large scale.

## West Virginia

MERCER COUNTY

*American Coal Company*—This company has been organized to develop coal lands near McComas. W. D. I. Walbridge, Hubert R. Makay and Harry Crane, of New York, and Miller G. Bucky, of Brooklyn, are the incorporators.

PRESTON COUNTY

*Arthurdale Coal and Coke Company*—This company has been incorporated to open coal mines at Arthurdale and Reedsville. E. M. Grant and T. J. Arthur, of Monongahela City, Penn., are among the incorporators.

## Canada

BRITISH COLUMBIA—BOUNDARY DISTRICT

*Granby*—The directors of this company last fall decided to increase the size of the smelting works from 3400 tons daily capacity to nearly 5000. In carrying out this plan, the length of the eight blast furnaces is being increased from 18½ ft. to 22½ ft. This also necessitates increasing the capacity of the converter plant by about 40 per cent., for which purpose three large converters, operated by electricity, are to be installed. It is hoped to have these improvements completed by the fall of 1908.

ONTARIO—COBALT DISTRICT

*Ore Shipments*—Shipments of ore for the week ending April 25 were as follows: Crown Reserve, 40,000 lb.; Cobalt Central, 10,600; La Rose, 292,200; McKinley-Darragh, 61,000; Nipissing, 101,170; Silver Queen, 44,000; Silver Leaf, 70,800; total 619,770 pounds.

*Beaver*—Shaft No. 1 is being sunk from its present level of 110 ft. to a depth of 200 feet.

*Foster-Cobalt*—The crosscut on the 210-ft. level has tapped veins Nos. 5 and 8. Stoping at this level has been commenced and a car of ore will be shipped shortly to the smelter at Swansea, Wales.

*Kerr Lake (Jacobs)*—Ninety men and 10 drills are working and a 20-ton car of high-grade ore will be shipped soon. Sinking is being continued in Nos. 3 and 7 shafts; the former will be sunk to a depth of 175 ft. and No. 7 to 250 ft. The company has purchased five acres between the Lawson and the Nugget properties and will shortly start men on surface prospecting.

*Peterson Lake*—Alternate 10-acre blocks of the property have been leased by the company to outside parties who will undertake thorough development.

*Silver Bird*—A meeting of shareholders was held in Toronto April 28 at which a report was presented estimating that $2000 would be required to put the mine on a shipping basis. It was decided to call for a voluntary assessment of 2c. per share, and to issue treasury stock in exchange at 15c. per share.

ONTARIO—HASTINGS COUNTY

*Bessemer*—This iron mine has been leased by the Mineral Range Iron Mining Company, which is in financial difficulties, to the Canada Furnace Company of Midland, Ont. The latter company intends to extract 600 tons of ore per day for its smelter.

## Mexico

CHIHUAHUA

*American Smelting and Refining Company*—The company has ordered the manager of the properties in the Santa Eulalia district to begin the shipment of ores to the company's new smelting works near Chihuahua.

*Encinillas Smelting Work*—This plant built by a French company at Santa Rosalia is practically ready for operation and will be blown in within a few days. The initial daily capacity will be 250 tons.

*Granadena*—The company will construct an aërial tramway from the mill to the Mexican Central railway station at Santa Barbara, a distance of about three miles. The capacity will be about 10 tons per hour and little or no power will be required, because the loads will travel down grade. The mill will resume work in about 60 days.

*Rica Mole*—This group of mines in the Parral district has been purchased by the Mexico Rica Mole Mining Company of which N. P. Wilson is the largest stockholder. The main shaft is down 265 ft. at which depth a body of silver ore has been partially developed. Shipments are to begin at once. A second shaft is being sunk 800 ft. north of the main shaft.

*Tecolotes*—The mill at Santa Barbara is said to be treating 18,000 tons of ore monthly. The property is owned by a subsidiary company of the Smelters' Securities Company.

DURANGO

*Mexican Consolidated Mining and Smelting Company*—The 150-ton cyanide plant in course of construction at San Pedro, Guanacevi, is nearly completed. The concentrating mill is treating 100 tons of ore per day and will probably be enlarged as soon as the cyanide plant is completed. The Soto mine is down 400 ft. and the Porvenir 265 ft. The company is purchasing about 25 tons of custom ore per day.

JALISCO

*Casados*—The Consolidated Mining Company, owning these mines in the Hostotipaquillo district, is shipping high-grade ore to the Torreon smelting works and milling ore to the mill at Amajac. The old workings have been unwatered, the main shaft has been extended 155 ft., and a 400-ft. adit has been driven at the east end of the property.

NUEVA LEON

*Joplin-Mexican Mining Company*—This company, composed largely of Joplin, Mo., men, will build a 200-ton concentrating plant on its property at Vallecillo. Foust jigs will be used in the mill.

OAXACA

*San Jose De Gracia*—This property, which lies between San Joaquin, the Manchega and the Corazon, has been purchased by the Mexican Mines Prospects Development Company, Ltd. The mine has not yet been extensively developed, but considerable ore has been blocked out above the adit level. The ore carries gold and silver. The equipment includes a 10-stamp mill, a hydro-electric power installation, electric hoist, pumps, and an aërial tramway. The mill was erected for concentration and amalgamation, but the process is to be changed to cyanidation. P. A. Babb is general manager of the Mexican Mines-Prospect Development Company.

## Europe

SPAIN

Exports of metals from Spain for the two months ended Feb. 29 are reported by the *Revista Minera* as follows, in metric tons:

| | 1907. | 1908. | Changes. | |
|---|---|---|---|---|
| Pig and manu. iron | 17,294 | 5,772 | D. | 11,522 |
| Copper | 979 | 1,419 | I. | 440 |
| Copper precipitate | 2,966 | 3,474 | I. | 508 |
| Lead | 28,942 | 26,303 | D. | 2,639 |
| Spelter | 29 | 402 | I. | 373 |
| Quicksilver | 417 | 422 | I. | 5 |

There was an increase in all metals except lead and iron. Exports of ores and minerals for the two months were, in metric tons:

| | 1907. | 1908. | Changes. | |
|---|---|---|---|---|
| Iron ore | 1,598,622 | 1,062,628 | D. | 535,994 |
| Copper ore | 183,322 | 192,487 | I. | 9,165 |
| Zinc ore | 33,963 | 13,283 | D. | 20,680 |
| Lead ore | 1,058 | 686 | D. | 372 |
| Manganese ore | 18,987 | 8,574 | D. | 10,413 |
| Pyrites | 195,812 | 231,343 | I. | 35,531 |
| Salt | 61,466 | 92,254 | I. | 30,788 |

Exports of sulphur were 3 tons in 1908. Imports of phosphate rock and basic slag were 15,820 tons in 1907, and 18,668 in 1908; an increase of 2848 tons.

## New Zealand

The Mines Department gives the exports of precious metals in January as follows, in ounces:

| | 1907. | 1908. | Changes. | |
|---|---|---|---|---|
| Gold, bullion | 27,510 | 59,072 | I. | 31,562 |
| Silver | 189,555 | 111,207 | D. | 78,348 |

The gold bullion exported this year was equal to $1,126,673, or 54,507 oz. fine gold.

## South America

BRITISH GUIANA

Exports of gold for the three months ended March 31 were 17,086 oz. bullion in 1907, and 12,044 oz. in 1908; a decrease of 5042 oz. The bullion reported this year was equal to $211,958, or 10,255 oz. fine gold. Exports of diamonds for the quarter this year were 399 carats, valued at $3124 in all.

CHILE

Coal output of Chile for 1907 is reported at 832,600 tons. Imports for the year were 1,521,650 tons.

# Metal, Mineral, Coal and Stock Markets

**Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks**

## QUOTATIONS FROM IMPORTANT CENTERS

### Coal Trade Review

*New York, May* 6—The coal trade in the East is still quiet and rather dull. The demand for bituminous coal on the Seaboard is not opening up well, and the Coastwise trade is small for the season. The stocks put in by the consumers last fall are not exhausted, apparently. Anthracite trade has shown a little activity, owing to the desire to take advantage of the discount, which is 40c. per ton for May.

In the West there are some hitches in the settlement of mining rates. Thus the Indiana miners and operators have not yet reached an agreement on several minor points. Apparently neither side is in a hurry, and trade is slack, so that many mines are operating only part time. There is much the same condition in Ohio. The demand for steam coal is everywhere light.

The Lake trade has not yet started, although navigation is fully open. The large ore boats have not started, and the stocks of coal on the docks at the head of the Lakes are not exhausted, so that there is no hurry to begin.

The commodity clause of the interstate commerce law—commonly known as the Hepburn act—took effect May 1, but nothing is being done as yet. The anthracite coal roads and many Western roads affected, have taken no steps to comply with the law. It is understood that a number of the companies concerned have come to an agreement with the Federal Department of Justice, under which a test case is to be made up and carried through the courts, up to the Supreme Court, in order to determine whether the law is constitutional. Until this case is decided, no action will be taken against other companies. This means that nothing will be done for several months, probably not this year.

The Panama canal contracts for coal have been let. Castner, Curran & Bullitt will supply 260,000 tons of Pocahontas coal, and the Berwind-White Coal Mining Company 100,000 tons of New River coal.

#### Coal Traffic Notes

Tonnage originating on Pennsylvania railroad lines east of Pittsburg and Erie, year to April 25, in short tons:

| | 1907. | 1908. | Changes. |
|---|---|---|---|
| Anthracite..... | 1,750,265 | 1,671,842 | D. 78,423 |
| Bituminous..... | 11,961,807 | 10,335,276 | D. 1,626,531 |
| Coke..... | 4,513,252 | 2,207,905 | D. 2,305,347 |
| Total..... | 18,225,324 | 14,215,023 | D. 4,010,301 |

Total decrease this year to date, 22 per cent.

The coal report of the Pittsburg Coal Company for the three months ended March 31, is as follows:

| | 1907. | 1908. | Changes. |
|---|---|---|---|
| Pittsburg district.. | 3,637,163 | 2,704,873 | D. 932,290 |
| Hocking district... | 219,715 | 205,599 | D. 14,116 |
| Total coal mined. | 3,856,878 | 2,910,472 | D. 946,406 |
| Coke made..... | 113,796 | 2,648 | D. 111,148 |

The decrease in coal mined this year was 24.5 per cent.

### New York

#### Anthracite

*May* 6—Prepared sizes are active and in good demand; the volume of business continues good and dealers are looking for the activity to continue during May, but do not look for much business in June. Pea coal is still short, but there seems to be a better supply than there was a week ago. All the other small steam sizes are in great abundance and it was reported that buckwheat No. 1 sold recently at $1.85 per ton at Port Reading; this would be $2.05 in New York harbor or 45c. per ton less than the circular price. Prices are as follows: Broken, $4.35; egg, stove and chestnut, $4.60; pea, $3.25@3.50; buckwheat No. 1, $2.35@2.50; buckwheat No. 2 or rice, $1.65@2; barley, $1.35@1.50; all f.o.b. New York harbor. The lower prices on steam coal are not the circular prices, but are for coal sold by independent dealers and the price depends largely upon quality.

#### Bituminous

Business is dull all along the Atlantic Seaboard. The far East shows no sign of life nor do other New England points; along the Sound business is a little better, but needs constant urging. New York harbor trade is flat and good grades of steam coal fetch $2.50@2.55 per ton. There seems to be no coal stored in this vicinity but dealers are not worrying on this score.

Transportation from mines to tide is about ordinary, and cars are abundant. In the Coastwise vessel trade small vessels are doing a little business, but large craft find it unprofitable to charter at the prices offered. Freight rates are as follows: From Philadelphia to Boston, 60c.; to Salem and Lynn, 65@70c.; Portsmouth, 65c.; Saco, $1 and towage; Bath, 70c.; Gardiner, 75c. and towage; Bangor, 75@80c.; Sound points, 50@55c. These rates are for large vessels.

### Birmingham

*May* 4—The coal production in Alabama has not improved, though preparations are being made to start up at least two mines in the Pratt division of the Tennessee company and two in Walker county by commercial coal companies. The annual convention of the United Mine Workers of America, Alabama district No. 20, will be held in June. According to Secretary J. L. Clemo the organization in Alabama has a membership of a little over 4000. A strike is on at the mines of the Alabama Consolidated Coal and Iron Company, but that company has secured a number of non-union men and is operating the mines right along.

The coke situation in Alabama shows no improvement in the least.

### Chicago

*May* 4—Sales of steam coal are increasing with the lessening of consumers' stocks. Fine coals are chiefly in demand, with the supply ample from mines east of Illinois. Contract-making is far from brisk, but some large contracts are being made. Open-market conditions in the last two or three years have been favorable to the consumer, which is generally recognized.

Illinois and Indiana prices are about as last week, $1.75@2.25 for lump, $1.70@1.90 for run-of-mine and $1.50@1.75 for screenings. Brazil block is quiet at $2.70. Hocking is in light demand at $3@3.15. Smokeless has a large supply and relatively small demand at 20 or 30c. less than circular prices. Youghiogheny has a light sale with little coal available at $3.20 for ¾-in. gas, and the same size steam coal 10c. less. Anthracite sales are fair and well distributed.

### Indianapolis

Thirty or more coal-mine operators and a number of coal consumers appeared before the Indiana Railroad Commission April 28, when the petition of the Indiana Manufacturers' and Shippers' Association for a schedule of joint coal rates between several coal-carrying roads was taken up.

The petition was filed after the roads had promulgated a coal schedule which represented an increase of 5c. a ton in the rates from at least 30 mines in southern Indiana to Indianapolis and the gas-belt cities. It was argued that if the increased rates are permitted to remain in force, the mine operators on the Southern Indiana road will be compelled to close their mines and the coal consumers in the gas belt

will turn to the Eastern mines for their coal. The commission entered an order re-establishing the former joint rates that were in effect previous to April 15 to be effective after May 5. This ruling will, it is thought, do away with the contention and in consequence no mine will be shut down.

### Pittsburg

*May* 5—Railroad mines are operated to about 30 per cent. of capacity and there is no urgent business on the books. The trouble that had been threatened has been practically averted, as the miners will not stand by their president in his demand that the differences in the Mercer-Butler field be settled speedily, or a strike in the Pittsburg district will follow. The river coal mines are in full operation and shipments to lower ports began on Sunday night, when the rivers were navigable for large boats. So far about 5,000,000 bu. of coal has gone out. Prices remain on a basis of $1.15 a ton for mine-run coal at mine, and $1.20 for current business.

*Connellsville Coke*—A drop in prices is noted this week. Furnace coke for prompt shipment sold as low as $1.50 and several sales were made at $1.55. On contract it is not likely that less than $1.80 could be done. Foundry coke can be bought at $2 a ton, but for best grades the lowest price named is $2.25 a ton at oven. The *Courier* in its report for the week gives production in both regions at 164,858 tons. Shipments for the week, 6257 cars, distributed as follows: To Pittsburg, 2281 cars; to points west of Connellsville, 3530 cars; to points east of Connellsville, 466 cars.

## Foreign Coal Trade

Imports of coal into Spain for the two months ended Feb. 29 were 311,977 tons, a decrease of 36,227 tons from 1907. Imports of coke, 37,799, a decrease of 4462 tons.

Foreign coal trade of Belgium, three months ended March 31, metric tons:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Coal | 1,339,121 | 1,050,805 | Imp. 288,316 |
| Coke | 94,472 | 202,477 | Exp. 108,005 |
| Briquets | 53,348 | 87,975 | Exp. 34,627 |
| Total | 1,486,941 | 1,341,257 | Imp. 145,684 |
| Total, 1907 | 1,529,963 | 1,374,290 | Imp. 155,673 |

Imports are chiefly from Germany, and exports to France.

## Iron Trade Review

*New York, May* 6—The iron trade remains quiet, so far as new business is concerned, but there is a great deal of discussion over prices, and the future is rather uncertain.

Some business has been done in pig iron, but almost all at prices below the level which the advisory committee sought to establish. Southern iron has had the call, and has been sold down, both on the Seaboard and in the West. It is claimed by some companies that they have maintained quotations on the basis of $12, Birmingham, for No. 2 foundry; but sales have been made lower, and there has been a gradual approach to the threatened $10, Birmingham. This has demoralized the market, and prices are rather uncertain, but Northern furnaces are not taking much hand in the competition.

The pig-iron market is the only really open market, chiefly because the largest interest is not a seller of pig. In prosperous times it is a buyer, but not at present. So far as made public, steel prices are being maintained, chiefly through the influence of that interest. This is causing complaint among buyers. They urge, for instance, that there is now $10 or $11 difference between bessemer pig and steel billets, which is far above the cost of conversion. A meeting of the advisory committee is to be held soon, which is likely to be an important one. Meantime some more structural contracts have been let at prices which seem to assume a lower cost of material.

It is reported that a considerable quantity of export business is under negotiation, and that some contracts have been closed. The prices on this business are carefully guarded, and no figures can be obtained.

*Lake Ore Traffic*—The Sault Ste. Marie canals opened on April 24 and for the first time in the history of the canal no American boat was waiting to pass through. Two Canadian steamers successfully negotiated the rivers and were locked through. Six more Canadian boats locked through on the following day. It is not expected that iron-ore traffic will start before June.

*United States Steel Corporation*—Reports have been current that there would be some difficulty at the annual meeting, and that the payment of bonuses to employees would be questioned. The meeting on April 20, however, passed without incident. The following directors, whose terms had expired, were re-elected without opposition: George F. Baker, William E. Corey, John F. Dryden, Clement A. Griscom, Marvin Hughitt, Daniel G. Reed, John D. Rockefeller, Jr., and Nathaniel Thayer.

### Baltimore

*May* 4—Exports for the week included 623 long tons of tin scrap, 161,499 lb. spelter and 179,245 lb. copper sulphate. In iron and steel exports there were 506 tons steel billets to Liverpool; 2031 tons steel rails and 268 tons angle-bars to Panama.

### Birmingham

*May* 4—Incidents of more than passing interest are taking place in the Southern iron market. While there is a general denial that there is to be any slashing of prices the rumor will not down.

Southern iron interests have been invited to two meetings and the understanding is that there will be a consideration of conditions. The invitations were sent out by General Sales Agent F. A. Burr, of the Tennessee company, for a meeting this week in the local office in Birmingham and for a dinner at New York, May 21, by the committee headed by E. H. Gary.

The Sloss-Sheffield Steel & Iron Company is making iron again at its No. 1 furnace in Birmingham. The furnace has recently undergone considerable repairing and should have a daily output of 200 tons. No. 2 furnace, adjacent, can be started up on short notice. Vice-president J. W. McQueen announces that the sales for April equalled the production. His quotations range between $12 and $12.50 per ton, No. 2 foundry; sales the latter part of the past week being made at $12.50 per ton. The Alabama Consolidated reports an increased production. The Sloss-Sheffield Company has four out of seven furnaces in blast. Mr. McQueen denies positively a report that he is preparing to let out 100,000 tons of No. 2 foundry at $10 per ton.

### Chicago

*May* 4—The iron market continues one of small lots sold for delivery within the next three months. Occasional lots run into the second half, but they are few. Melters of pig iron will not contract ahead generally for their requirements. Inquiries are numerous but do not develop orders. Present sales are from carload lots to 500 tons.

Quotations remain practically unchanged. Southern No. 2 is at $12 Birmingham ($16.35 Chicago) on most business, with some business at 50c. less. Northern holds to $17 for No. 2, with production much curtailed and sales very small. Northern charcoal remains at $20 @20.50.

Practically all iron and steel products are hard to dispose of. Railroad buying does not increase materially; structural contracts are few, and plates, sheets, etc., are very dull. Coke is in light demand at $4.90 for the best Connellsville.

### Philadelphia

*May* 6—The furnace output of eastern and middle Pennsylvania has been further reduced under the failure to attract buyers, for which outside competition is responsible. The belief prevails that Southern iron will be held where it is, but that some extraordinary course may be pursued in order to work off a portion of the present accumulation. Another anticipation is occasionally expressed that large consumers will soon conclude that rock-bottom prices have finally been reached and that nothing will likely be lost by

coming into the market Forge is extremely dull. Prices are nominal.

*Steel Billets*—There are indications this week that as soon as prices are definitely settled some billet contracts will be placed. There is scarcely any material on hand here, and but little disposition to buy.

*Bars*—The demand is quite steady, but light. Mills make about the same time week after week. The retail demand at a few of the large city stores is improving.

*Sheets*—This branch continues to show a slight improvement each week. An occasional contract comes along for future delivery.

*Pipes and Tubes*—Work is irregular in the plants working up pipe material and especially tubes.

*Plates*—Every opportunity to make a sale or get a contract for plate is followed up by aggressive salesmen. Nothing of importance has developed. The retail demand is steady.

*Structural Material*—The deeply seated conviction that prices should be cut in the minds of those who have large building and construction enterprises in view accounts to some extent for the small amount of business in shapes. Large consumers hope the steelmakers will see things differently at their next meeting.

*Scrap*—The movement of scrap has increased. Dealers who can guarantee deliveries in June can find ready takers for heavy steel scrap and heavy cast. The railroad scrap output is taken promptly at good prices.

### Pittsburg

*May* 5—While the outlook for the iron and steel trade is not decidedly encouraging, it cannot be regarded as discouraging. The principal representative of one of the largest steel interests of the country, with headquarters in this city, in diagnosing the situation today declared with emphasis: "We are positively facing prosperity. I base this from the fact that in the first three days of this month we booked more business than in the first three days of any month of the year. While this will hardly keep up, I am sure that there has been a turn and that before the opening of the second half conditions will show a return to a normal basis. The only thing that has retarded a good buying movement was the report last week of Southern pig iron being sold at $10 a ton at Birmingham. This price was suggested by President W. E. Corey, of the United States Steel Corporation, but he was opposed by the large interests in the South. It is known that his idea was to eliminate the large stocks at Southern furnaces by sending them to European markets. With these stocks out of the way he believed that higher prices could be obtained when the domestic demand was developed. Mr. Corey was opposed in his views by other iron and steel men, and the meeting at which prices were to be named on April 30 was postponed for one week. In the meantime, Mr. Corey sailed for Europe. The big iron producers in the South refuse to sell at the figure named and the lowest price quoted this week is $11.50, Birmingham. One large company will not sell at less than $12. It may be a good scheme to clear up the surplus stocks with a profit of from $1.50 to $2 a ton, but the large producers will not enter into the project, as it is not necessary to sell at low prices to boost the market under present conditions."

The American Sheet and Tin Plate Company is running 213 tin-plate mills this week. The Carnegie Steel Company is operating its principal works on an average of one-half capacity.

*Pig Iron*—The recent disturbance in the pig-iron market has affected the prices in this district. Bessemer iron is on a basis of $16, Valley furnaces, and only a few lots in small tonnages are recorded at a higher price. The average for April was announced this week at $16.59 at furnace, which indicates that large sales were at a low price. Basic iron is down to $15.50, but some sales are reported at a lower figure. No. 2 foundry has sold down to $14.50 and gray forge is quoted at $14. Only six of the 19 merchant furnaces in the two valleys are going this week.

*Steel*—There is no change in the situation, as no new business in crude steel is being offered. Prices of billets remain at $28, Pittsburg, the makers absorbing one-half the freight. Sheet-bars and tin-plate-bars are still quoted at $29.50, delivered to near-by points. Tank plate is strong at 1.70c. and merchant-steel bars are weak at 1.60c.

*Sheets*—The market does not show any material improvement. Black sheets remain 2.50c.; galvanized, 3.55c. for No. 28 gage.

*Ferro-Manganese*—Quotations for prompt delivery are $44@44.50, Pittsburg.

## Foreign Iron Trade

The German Iron and Steel Union reports the production of pig iron in February at 994,186 metric tons; a decrease of 67,143 tons from January. The average daily output, however, increased from 34,236 tons in January to 34,282 in February. For the two months ended Feb. 29 the production was, in metric tons:

| | 1907 | | 1908 | |
|---|---|---|---|---|
| | Tons. | PerCt. | Tons. | PerCt. |
| Foundry iron | 343,605 | 16.8 | 383,652 | 18.7 |
| Forge iron | 132,352 | 6.5 | 116,944 | 5.7 |
| Steel pig | 161,238 | 7.9 | 177,253 | 8.6 |
| Bessemer pig | 77,558 | 3.8 | 76,243 | 3.7 |
| Thomas pig | 1,325,590 | 65.0 | 1,301,423 | 63.3 |
| Total | 2,040,343 | 100.0 | 2,055,515 | 100.0 |

There were increases of 40,047 tons in foundry iron, and of 16,015 in steel pig, which includes spiegeleisen, ferromanganese and all similar alloys; decreases of 15,408 tons in forge iron, 1315 in bessemer, and 24,167 in Thomas, or basic pig; the total gain being 15,172 tons, or 0.7 per cent.

*British Iron and Steel Trade*—Exports of iron and steel from Great Britain, three months ended March 31:

| | 1907. | 1908. | Changes. |
|---|---|---|---|
| Quantities, l. tons | 1,268,135 | 989,259 | D. 278,876 |
| Values | £11,363,080 | £9,473,501 | D. £1,889,579 |

Exports of machinery, value, £7,007,486 in 1907, and £7,776,549 in 1908; new ships, £2,159,298 and £2,281,264, respectively.

Imports of iron and steel into Great Britain, for three months ended March 31:

| | 1907. | 1908. | Changes. |
|---|---|---|---|
| Quantities, l. tons. | 205,379 | 246,945 | I. 41,566 |
| Values | £1,607,479 | £1,826,272 | I. £218,793 |

Imports of machinery, value, £1,203,243 in 1907, and £1,302,562 this year.

*British Steel Production*—The production of open-hearth steel in Great Britain for the full year was, in long, tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Acid | 3,378,691 | 3,384,780 | I. 6,089 |
| Basic | 1,176,245 | 1,278,709 | I. 102,464 |
| Total | 4,554,936 | 4,663,489 | I. 108,553 |

The chief increase, as shown, was in basic steel.

## Metal Market

NEW YORK, May 6.

**Gold and Silver Exports and Imports**
At all U. S. Ports in March and year.

| Metal. | Exports. | Imports. | Excess. |
|---|---|---|---|
| **Gold:** | | | |
| Mar. 1908.. | $ 1,447,206 | $ 3,618,885 | Imp. $2,171,679 |
| " 1907.. | 2,126,173 | 5,046,243 | " 2,920,070 |
| Year 1908.. | 3,859,003 | 17,398,551 | " 13,539,548 |
| " 1907.. | 5,703,304 | 11,646,615 | " 5,943,317 |
| **Silver:** | | | |
| Mar. 1908.. | 4,329,369 | 3,723,307 | Exp. $606,062 |
| " 1907.. | 5,058,461 | 4,006,497 | " 1,051,964 |
| Year 1908.. | 12,586,257 | 10,796,986 | " 1,791,271 |
| " 1907.. | 14,669,396 | 11,385,526 | " 3,283,870 |

Exports from the port of New York, week ended May 2: Gold, $4,053,103, chiefly to France; silver, $832,846, chiefly to London. Imports for the week: Gold, $112,191, from the West Indies and Central America; silver, $28,022, from the West Indies.

Specie holdings of the leading banks of the world May 2 are reported, as below, in dollars:

| | Gold. | Silver. | Total. |
|---|---|---|---|
| Ass'd New York | ..... | ..... | $308,045,000 |
| England | $186,752,200 | ..... | ..... |
| France | 569,426,770 | $181,057,750 | 750,484,520 |
| Germany | 172,505,000 | 71,500,000 | 244,005,000 |
| Spain | 77,710,000 | 131,970,000 | 209,680,000 |
| Netherlands | 38,489,500 | 21,781,000 | 60,270,500 |
| Belgium | 20,406,665 | 10,203,335 | 30,610,000 |
| Italy | 181,680,000 | 22,000,000 | 203,680,000 |
| Russia | 560,535,000 | 34,780,000 | 595,315,000 |
| Aust.-Hungary | 233,115,000 | 67,170,000 | 300,285,000 |
| Sweden | 19,480,000 | ..... | 19,480,000 |
| Norway | 8,350,000 | ..... | 8,350,000 |
| Switzerland | 16,845,000 | ..... | 16,845,000 |

The New York banks do not separate gold and silver. The foreign statements are from the *Commercial and Financial Chronicle* of New York.

The Treasury Department's estimate of the amount and kinds of money in the United States May 1 is as follows:

| | In Treasury. | In Circul'n. |
|---|---|---|
| Gold coin (inc. bullion in Treasury) | $ 164,187,627 | $ 628,168,888 |
| Gold certificates | 29,584,390 | 817,326,479 |
| Silver dollars | 18,569,588 | 80,750,394 |
| Silver certificates | 17,520,019 | 446,257,981 |
| Subsidiary silver | 20,267,842 | 124,541,160 |
| Treasury notes of 1890 | 12,735 | 5,139,265 |
| U. S. notes | 10,449,437 | 336,231,579 |
| Nat. bank notes | 49,767,343 | 647,878,355 |
| Total | $310,368,981 | $3,086,294,101 |

Population of the United States May 1, 1908, estimated at 87,258,000; circulation per capita, $35.37. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the treasury as assets of the Government does not include deposits of public money in National Bank depositaries to the credit of the treasurer of the United States, amounting to $188,670,863. Amount in circulation May 1, shows increases of $5,843,367 over April 1, and of $154,188,076 over May 1 of last year.

Foreign commerce of the United States, three months ended March 31, valued by Bureau of Statistics, Department of Commerce and Labor, as follows:

| Merchandise: | 1907. | 1908. |
|---|---|---|
| Exports | $ 510,499,393 | $ 514,926,702 |
| Imports | 383,702,787 | 258,866,895 |
| Excess, exports | $ 126,796,606 | $ 256,059,807 |
| Add excess of exports, silver | | 1,791,271 |
| Total | | $ 257,851,078 |
| Deduct excess of imports, gold | | 13,539,548 |
| Net export balance | | $ 244,311,530 |

The gold and silver movement in detail is given in the table at the head of this column.

Gold and silver movement in Great Britain, three months ended March 31:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Gold | £11,167,244 | £8,024,886 | Imp. £3,142,358 |
| 1907 | 12,701,421 | 9,049,181 | Imp. 3,652,240 |
| Silver | 2,222,857 | 3,616,822 | Exp. 1,393,965 |
| 1907 | 5,089,195 | 5,390,824 | Exp. 301,629 |

The movement of gold and silver through the port of San Francisco for the two months ended Feb. 29 last is reported as follows:

| | Gold. | Silver. |
|---|---|---|
| Exports | $ 3,603 | $596,563 |
| Imports | 811,733 | 530,368 |
| Excess | Imp. $808,130 | E. $166,195 |

All the exports of silver, except $1575, and all the imports, except $700, were in bullion.

## Silver Market

SILVER AND STERLING EXCHANGE.

| Apr.-May. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. | May. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. |
|---|---|---|---|---|---|---|---|
| 30 | 4.8700 | 52¾ | 24 5/16 | 4 | 4.8675 | 52⅞ | 24⅜ |
| 1 | 4.8680 | 52⅜ | 24 7/16 | 5 | 4.8680 | 52½ | 24 3/16 |
| 2 | 4.8690 | 52⅞ | 24⅜ | 6 | 4.8690 | 52 | 24 |

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

The quotation for silver in London on April 25 was given last week at 25 11/16d. by a typographical error. It should have been 24 11/16 pence.

Messrs. Pixley & Abell report silver shipments from London to the East for the year to April 23:

| | 1907. | 1908. | Changes. |
|---|---|---|---|
| India | £4,409,784 | £2,310,438 | D. £2,099,346 |
| China | ..... | 506,400 | I. 506,400 |
| Straits | 265,500 | 90,200 | D. 175,300 |
| Total | £4,675,284 | £2,907,038 | D. £1,768,246 |

Receipts for the week were £4000 from Chile, £12,000 from the West Indies and £177,000 from New York; £193,000 in all. Exports were £159,900 to India.

The silver market has suffered a further sharp decline this week, closing at 24d. in London. The Chinese banks are selling silver, owing to poor business conditions in China, and India bazaar buying is very slack, so that the outlook for much improvement in the demand for silver is not encouraging.

## Copper, Tin, Lead and Zinc

| Apr.-May. | Copper. Lake, Cts. per lb. | Copper. Electrolytic, Cts. per lb. | Copper. London, £ per ton. | Tin. Cts. per lb. | Lead. Cts. per lb. | Spelter. New York, Cts. per lb. | Spelter. St. Louis, Cts. per lb. |
|---|---|---|---|---|---|---|---|
| 30 | 12¾ @13 | 12⅛ @12¾ | 57½ | 31¾ | 4.05 @4.10 | 4.65 @4.70 | 4.50 @4.55 |
| 1 | 12⅝ @12⅞ | 12⅝ @12¾ | 56⅞ | 31⅝ | 4.05 @4.10 | 4.62½ @4.67½ | 4.47½ @4.52½ |
| 2 | 12⅝ @12⅞ | 12⅝ @12¾ | ..... | 31⅝ | 4.05 @4.10 | 4.62½ @4.65 | 4.47½ @4.50 |
| 4 | 12⅝ @12⅞ | 12⅝ @12⅝ | 57 | 31¾ | 4.10 @4.15 | 4.62½ @4.65 | 4.47½ @4.50 |
| 5 | 12⅝ @12⅞ | 12½ @12⅝ | 57⅜ | 31½ | 4.15 @4.20 | 4.62½ @4.65 | 4.47½ @4.50 |
| 6 | 12⅜ @12⅞ | 12½ @12⅝ | 57⅛ | 31⅜ | 4.17½ @4.22½ | 4.62½ @4.65 | 4.47½ @4.50 |

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

*Copper*—Early in the week some little business with the domestic consumers was transacted in Lake and electrolytic copper; yesterday and today some considerable business, both for domestic and foreign, is reported in certain quarters, while others report stagnation. The characteristic of the week, April 29-May 6, has been dullness. The foreign market has been largely indifferent to offerings from this side, and the field of operations has been narrowed to the domestic market, which continues small. It is not surprising, therefore, that prices have receded somewhat further, although generally speaking, there is a steady, but exceedingly slow increase in the home requirements. Quotations at the close are barely steady at 12⅝@12⅞c. for Lake copper, and 12½ @12⅝ for electrolytic. The average of casting during the week has been 12¼@ 12½c.

The standard market in London has been featureless throughout the week, fluctuations being narrow and transactions of small proportions. The close is cabled at £57 12s. 6d. for spot, £58 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £61@62; best selected, £61@62; strong sheets, £73@74.

Statistics for the second half of April show an increase in the visible supplies of 2900 tons.

Exports of copper from New York and Philadelphia for the week were 5452 tons. Exports from Baltimore for the week are reported by our special correspondent at 2445 long tons of copper.

In the Atlantic copper mine on the twelfth level south, some 6 ft. of rich copper rock has been struck. It is believed that this is the Baltic lode, for which search has been in progress for some time.

*Manufactured Copper*—Sheets, cold-rolled, 18c.; hot-rolled, 17c. Wire, 14¾c. base.

*Tin*—The London market has slowly declined during the last week, mainly on account of the absence of a larger demand from this side. It closes steady at £140 for spot, £139 12s. 6d. for three months.

Since the requirements of the largest consumer in our home market have been taken care of by heavy purchases made during last week, the demand has again become very slack, and the premium on spot metal reduced. At the close the quotation is about 31⅜ for spot tin.

Statistics for the month of April show a decrease in the visible supplies of 2600 tons.

Sales of Billiton tin are reported made this week in Holland, by private tender, at 85 fl., which is equivalent to £141 7s. 6d. per ton, c.i.f. Amsterdam.

Tin stocks May 1, in long tons, are reported as follows:

| | In Store. | Afloat. | Total. |
|---|---|---|---|
| London | 5,877 | 3,236 | 9,113 |
| Holland | 573 | 187 | 760 |
| U. S., exc. Pacific ports | 1,135 | 2,233 | 3,368 |
| Total | 7,585 | 5,656 | 13,241 |

The total shows a decrease from that reported April 1 of 2144 tons.

*Lead*—The upward movement in this metal has continued throughout the week and there has been a good business doing from day to day. The close is firm at 4.17½@4.22½c. New York.

The London market has declined further, on account of pressure to place new arrivals, and closes steady at £12 17s. 6d. for Spanish lead, £13 for English lead.

The pool among the manufacturers of lead pipe, in existence for a year or more, has been disrupted, and pipe is now selling for about ¼c. per lb. above the price of pig lead. During the existence of the pool the price was maintained at 1c. per lb. over the market price of pig lead.

*Spelter*—Every order is being eagerly competed for. Prices have again declined, the metal being quoted at the close at 4.62½@4.65c. New York, 4.47½@4.50c. St. Louis.

The London market is also weaker, and closes at £20 15s. for good ordinaries, £21 for specials.

*Zinc Sheets*—Base price is 7c. f.o.b. Lasalle-Peru, less 8 per cent.

### Other Metals

*Antimony*—The market is quiet and only a small volume of business is being done. Quotations are 8¾@9c. for Cookson's; 8½@8¾c. for Hallett's and 8¼@8⅜c. for ordinary brands.

*Aluminum*—Ingots, American No. 1, in large quantities, 33c. per lb. Rods and wire, 38c. base; sheets, 40c. base.

*Cadmium*—In 100-lb. lots, $1.25 per lb., Cleveland, Ohio.

*Nickel*—According to size of lot and terms of sale, 45@50c., New York.

*Quicksilver*—New York, $45 per flask. San Francisco, large lots nominal at $44.50, domestic, and $43, export; small orders, $45@$46. London, £8 5s.

*Platinum*—Prices are unchanged at $26 per ounce for hard platinum, $23.50 for ordinary, and $16 for scrap.

## Wisconsin Ore Market

*Platteville, Wis., May 2*—The highest price paid this week for zinc ore was $37.50 on a basis of $36@37 per ton of 60 per cent. zinc. Lead ore sold at $52 per ton of 80 per cent. lead.

Ore shipments, week ended May 2, were:

| Camps. | Zinc ore, lb. | Lead ore, lb. | Sulphur ore, lb. |
|---|---|---|---|
| Benton | 608,700 | 80,180 | ..... |
| Platteville | 269,720 | ..... | ..... |
| Livingston | 190,000 | ..... | ..... |
| Galena | 160,000 | ..... | ..... |
| Highland | 125,400 | ..... | ..... |
| Linden | 105,250 | ..... | ..... |
| Dodgeville | 97,520 | ..... | ..... |
| Cuba City | 77,220 | ..... | ..... |
| Mineral Point | 67,000 | ..... | ..... |
| Elmo | 67,000 | ..... | ..... |
| Hazel Green | 66,500 | 146,100 | ..... |
| Rewey | 61,000 | ..... | ..... |
| Days Siding | 50,000 | ..... | ..... |
| Total | 1,945,310 | 226,280 | ..... |
| Year to May 2 | 23,445,090 | 2,078,345 | 79,800 |

Fires were started during the week in one block of the furnaces at the Mineral Point Zinc Works and the manufacture of oxide resumed. It is reported that extensive improvements will be made to the plant during the present season. A market is now afforded to the producers of zinc carbonate.

The electrostatic separator at Platteville will commence next week operating two shifts of 12 hours each per day, and larger purchases of low and intermediate grades of blende concentrates will naturally follow.

## Missouri Ore Market

*Joplin, Mo., May 2*—The highest price for zinc ore was $39, on an assay of $36.50 per ton of 60 per cent. zinc, ranging down to $34 per ton. The average price, all grades, was $33.94, lowered on account of heavy silicate sales. The highest price of lead was $55.50 for this week's delivery, with offerings today of $56.50 for next week. The average price this week was $53.80 per ton.

The continued heavy rains of April are being felt in the mine workings to the extent that several have been forced to abandon the lower levels temporarily, until additional pumping capacity can be installed to lower the increased head coming from shallow surface workings left unprotected against the rainfall.

Following are the shipments of zinc and lead ore from the district for the week ending May 2:

| | Zinc, lb. | Lead, lb. | Value. |
|---|---|---|---|
| Webb City-Carterville | 3,191,580 | 773,180 | $76,626 |
| Joplin | 1,753,990 | 324,140 | 40,321 |
| Badger | 1,753,990 | 4,950 | 19,801 |
| Galena | 652,770 | 148,170 | 15,297 |
| Alba-Neck City | 510,100 | ..... | 9,181 |
| Duenweg | 361,900 | 90,930 | 8,787 |
| Granby | 554,850 | 16,320 | 7,535 |
| Prosperity | 273,300 | 101,430 | 7,520 |
| Oronogo | 367,800 | 1,450 | 6,495 |
| Aurora | 379,190 | 15,990 | 5,985 |
| Carthage | 301,820 | ..... | 5,583 |
| Spurgeon | 366,090 | 32,260 | 4,441 |
| Zincite | 141,780 | ..... | 2,480 |
| Sarcoxie | 137,520 | ..... | 2,337 |
| Quapaw-Baxter | 60,600 | 47,510 | 2,281 |
| Carl Junction | 106,760 | 10,970 | 2,163 |
| Cave Spring | 122,280 | ..... | 2,139 |
| Totals | 10,416,240 | 1,567,300 | $218,972 |
| 18 weeks | 163,899,620 | 23,416,490 | $3,426,672 |
| Zinc value, the week, $176,808; 18 weeks, | | | $2,839,923 |
| Lead value, the week, 42,164; 18 weeks, | | | 586,749 |

Average ore prices in the Joplin market were, by months:

| ZINC ORE AT JOPLIN. | | | LEAD ORE AT JOPLIN. | | |
|---|---|---|---|---|---|
| Month. | 1907. | 1908. | Month. | 1907. | 1908. |
| January | 45.84 | 35.56 | January | 83.58 | 46.88 |
| February | 47.11 | 34.92 | February | 84.68 | 49.72 |
| March | 48.66 | 34.19 | March | 82.75 | 49.90 |
| April | 48.24 | 34.08 | April | 79.76 | 52.47 |
| May | 45.98 | ..... | May | 79.56 | ..... |
| June | 44.82 | ..... | June | 73.66 | ..... |
| July | 45.79 | ..... | July | 58.18 | ..... |
| August | 43.22 | ..... | August | 59.54 | ..... |
| September | 40.11 | ..... | September | 53.52 | ..... |
| October | 39.83 | ..... | October | 51.40 | ..... |
| November | 35.19 | ..... | November | 43.40 | ..... |
| December | 30.87 | ..... | December | 37.71 | ..... |
| Year | 43.68 | ..... | Year | 68.90 | ..... |

## Chemicals

*New York, May 6*—The general market is quiet and no improvement has developed. The consumption of chemicals is light, especially in the textile, paper and allied trades. Prices are about the same as for several weeks, except in certain special chemicals or minerals.

*Copper Sulphate*—The market is quiet and the agricultural demand is nearly satisfied, although some late orders have been received. Prices received a sharp setback yesterday and quotations now are $4.65 per 100 lb. for carloads and $4.90 for barrel lots.

*Nitrate of Soda*—The market is quiet, but firm, and no price concessions are noted except in individual cases now and then. Spot 95 per cent. is selling for 2.32½@2.35c., and for other positions of 1908 the price is 2.30c. Deliveries in 1909 fetch about 2.30c., and for 1910 the quotation is 2.32¼c. per lb. The 96-per cent. grade sells 5c. per 100 lb. higher.

## Mining Stocks

*New York, May 6*—The general stock markets have shown rather a strong tone through the week, with occasional reactions, but generally an upward tendency. Trading has been in fair volume, but hardly as active as in the preceding week. The close was rather irregular.

The total amount of gold shipped to Europe on the recent movement was $14,000,000. This was not enough to have any appreciable effect on the money market here.

In the curb market, mining shares were rather dull. The copper stocks were sluggish, but there was little or no decline in prices. Fluctuations were small, and the actual buying demand was moderate. There was a good deal of trading in the Cobalt and Nevada stocks, with no important changes in price. Montgomery-Shoshone improved a little from the break of the previous week. Yukon Gold revived, so far as selling was concerned, but at low quotations.

### Boston

*May 5*—A sharp upward movement in Copper Range Consolidated and Atlantic Mining has been the only feature of moment in the share market locally. Both advances were caused by buying for Lake Superior account caused by the reported striking of the Baltic lode. The former rose $3.50 to $71 on unfounded reports of the striking of this lode on the leased Globe tract. Atlantic is up $4 to $13.62½ on reports that section 16 had reached this lode.

The copper-share market has been generally firm. Banks are better disposed toward these stocks as collateral, which is a considerable factor. Amalgamated closes the week within 50c. of its high point at $61.37½. North Butte, which rose to $59.75, closes $2 below this, while Butte Coalition, which rose $1.50 to $23.25, closed slightly lower. Calumet & Hecla is $15 higher at $650; Isle Royale held firm at $19@20, and Superior Copper advanced $3 to $18 per share.

On the curb Lawson's Yukon Gold made a low point at $3.37½, recovering slightly from this. Hancock, selling on the curb, sold off $1 to $4. This company has made a call of $3, which will make a total of $13 per share paid in.

## Joplin, Mo.

*May* 2—The banquet in honor of the opening of the Stock Exchange took place at the Hotel Connor in Joplin on the evening of April 28. It was very successful. Speeches were made by Mayor J. F. Osborne, Frank L. Yale, John C. Swanger and others.

The officers of the exchange are: Burt W. Lyon, president; Frank L. Yale, first vice-president; Amos D. Hatten, second vice-president; T. W. Cunningham, treasurer; Jas. F. Gallagher, secretary and manager. The Listing Committee is composed of E. C. Matthews, E. A. Norris and W. H. Picher.

## STOCK QUOTATIONS

| NEW YORK | May 5 |
|---|---|
| Name of Comp. | Clg. |
| Alaska Mine | ½ |
| Amalgamated | 61½ |
| Anaconda | 38¼ |
| Balaklala | ‡2½ |
| British Col. Cop. | 4⅜ |
| Butte & London | ⅛ |
| Butte Coalition | 22¾ |
| Colonial Silver | ⅝ |
| Cum. Ely Mining | 8⅛ |
| Davis Daly | 3¼ |
| Dominion Cop. | 1⅜ |
| Douglas Copper | 4¾ |
| El Rayo | 17⅛ |
| Florence | 3¼ |
| Foster Cobalt | ⅛ |
| Furnace Creek | .15 |
| Giroux | 3¾ |
| Gold Hill | ⅝ |
| Goldfield Con | 5⅛ |
| Granby | ‡90¼ |
| Greene Gold | ⅛ |
| Greene G. & S | ⅛ |
| Greenw'r & D.Val. | .75 |
| Guanajuato | 2¼ |
| Guggen. Exp. | 160 |
| Hanapah | ‡.20 |
| McKinley Dar. | .80 |
| Micmac | 4 |
| Mines Co. of Am. | 1½ |
| Mitchell Mining | ⅛ |
| Mont. Sho. C. | 1¼ |
| Nev. Utah M. & S. | 4⅜ |
| Newhouse M. & S. | 7⅞ |
| Nipissing Mines | 7 |
| Old Hundred | ½ |
| Silver Queen | 1.14 |
| Stewart | 1 |
| Tennessee Cop'r. | 38 |
| Tri-Bullion | 1⅛ |
| Union Copper New | ⅛ |
| Utah Apex | 4⅛ |
| Utah Copper | 28¾ |
| Yukon Gold | 4 |

| N. Y. INDUSTRIAL | |
|---|---|
| Am. Agri. Chem. | 19¾ |
| Am. Smelt. & Ref. | 72¼ |
| Am. Sm. & Ref., pf. | 96⅛ |
| Bethlehem Steel | ‡15¼ |
| Colo. Fuel & Iron | 24⅞ |
| Federal M. & S., pf. | 69⅛ |
| Inter. Salt | 15½ |
| National Lead | 62⅛ |
| National Lead, pf. | 98 |
| Pittsburg Coal | ‡11⅛ |
| Republic I. & S. | 18 |
| Republic I. & S., pf. | 67⅜ |
| Sloss-Sheffield | 45⅜ |
| Standard Oil | 599½ |
| U. S. Red. & Ref. | .... |
| U. S. Steel | 36⅝ |
| U. S. Steel, pf | 102⅛ |
| Va. Car. Chem. | 20¼ |
| Va. I. Coal & Coke | ‡48 |

| ST. LOUIS | May 2 | |
|---|---|---|
| N. of Com. | High. | Low. |
| Adams | .30 | .25 |
| Am. Nettie | .04 | .03 |
| Center Cr'k | 2.00 | 1.50 |
| Cent. C. & C. | 66.00 | 64.00 |
| C.C. & C. pd. | 76.00 | 75.00 |
| Cent. Oil | 100.00 | 95.00 |
| Columbia | 4.00 | 3.00 |
| Con. Coal | 19.00 | 16.00 |
| Doe Run | 125.00 | 110.00 |
| Gra. Bimet. | .25 | .20 |
| St. Joe | 15.00 | 12.50 |

| BOSTON | May 5 |
|---|---|
| Name of Comp. | Clg. |
| Adventure | ‡1¾ |
| Allouez | ‡25¼ |
| Am. Zinc | ‡23½ |
| Arcadian | 3¼ |
| Arizona Com | 18 |
| Atlantic | 13¾ |
| Bingham | .25 |
| Boston Con | 12 |
| Calumet & Ariz* | 103 |
| Calumet & Hecla | 650 |
| Centennial | ‡22 |
| Con. Mercur | .40 |
| Copper Range | 70 |
| Daly-West | 9 |
| Franklin | 7½ |
| Greene—Can | 8⅛ |
| Isle Royal | 19¼ |
| La Salle | 14 |
| Mass | 2½ |
| Michigan | 10⅛ |
| Mohawk | 48 |
| Nevada | 11½ |
| North Butte | 57¾ |
| Old Colony | ‡.50 |
| Old Dominion | 34½ |
| Osceola | 84 |
| Parrot | 19¾ |
| Quincy | 81 |
| Rhode Island | 2⅛ |
| Santa Fe | ‡1⅝ |
| Shannon | 12 |
| Superior | 18 |
| Tamarack | 58 |
| Trinity | 13¼ |
| United Cop., com. | ‡61⅞ |
| U. S. Oil | ‡22 |
| U. S. Smg. & Ref. | ‡38 |
| U.S.Sm. & Re.,pd. | 41¾ |
| Utah Con | 38⅞ |
| Victoria | ‡2¾ |
| Winona | ‡4¾ |
| Wolverine | 126 |
| Wyandotte | ‡.60 |

*Ex. Div. †Ex. Rights.
‡Last quotation.

| BOSTON CURB | |
|---|---|
| Ahmeek | ‡69 |
| Black Mt. | 5⅛ |
| East Butte | 5 |
| Hancock Con | 4 |
| Keweenaw | 5 |
| Majestic | .99 |
| Raven | 1 |
| Shawmut | .34 |
| Superior & Pitts | 12 |
| Troy Man | ‡.51 |

| LONDON | May 6 | | |
|---|---|---|---|
| Name of Com. | Clg. | | |
| Dolores | £1 | 5s | 0d |
| Stratton'sInd. | 0 | 1 | 6 |
| Camp Bird | 0 | 14 | 0 |
| Esperanza | 1 | 6 | 0 |
| Tomboy | 1 | 11 | 3 |
| El Oro | 1 | 3 | 9 |
| Oroville | 0 | 11 | 6 |
| Somera | ... | | . |
| Utah Apex | ... | | . |
| Ariz. Cop.,pfd. | ... | | . |
| Ariz. Cop.,def. | ... | | . |

Cabled through Wm. P. Bonbright & Co., N.Y.

NEVADA STOCKS. May 6.
Furnished by Weir Bros. & Co., New York.

| Name of Comp. | Clg. | Name of Comp. | Clg. |
|---|---|---|---|
| COMSTOCK STOCKS | | Silver Pick | .20 |
| Belcher | .22 | St. Ives | .31 |
| Best & Belcher | .57 | Triangle | .07 |
| Caledonia | .16 | BULLFROG STOCKS | |
| Chollar | .10 | Bullfrog Mining | .06 |
| Comstock | .40 | Bullfrog Nat. B. | .07 |
| Con. Cal. & Va. | .39 | Gibraltar | .06 |
| Crown Point | .30 | Gold Bar | .15 |
| Exchequer | .22 | Homestake King. | .31 |
| Gould & Curry | .10 | Montgomery Mt. | .08 |
| Hale & Norcross. | .33 | Mont. Shoshone C. | 1.00 |
| Mexican | 1.35 | Original Bullfrog. | .02 |
| Ophir | 2.52½ | Tramp Cons | .19 |
| Overman | .10 | MANHAT'N STOCKS | |
| Potosi | .15 | Manhattan Cons. | .12 |
| Savage | .25 | Manhat'n Dexter. | .05 |
| Sierra Nevada | .39 | Jumping Jack | .03 |
| Union | .37 | Stray Dog | .04 |
| Utah | ... | MISCELLANEOUS | |
| Yellow Jacket | .66 | Golden Boulder | .07 |
| TONOPAH STOCKS | | Bonnie Clare | .15 |
| Belmont | 1.12½ | Lee Gold Grotto | ... |
| Extension | 1.06¼ | Nevada Hills | 2.25 |
| Golden Anchor | .03 | Nevada Smelting. | 1.25 |
| Jim Butler | .30 | Pittsburgh S. Pk. | 1.15 |
| MacNamara | .29 | Round Mt. Sphinx | .26 |
| Midway | .45 | | |
| Montana | 1.65 | | |
| North Star | .11 | | |
| Tono'h Mine of N. | 8.31¼ | | |
| West End Con | .41 | | |
| GOLDFI'D STOCKS | | | |
| Adams | .05 | | |
| Atlanta | .24 | | |
| Booth | .20 | | |
| Columbia Mt. | .19 | | |
| Comb. Frac | .63 | | |
| Cracker Jack | .07 | | |
| Dia'dfield B. B. C. | .18½ | | |
| Goldfield Belmont | .15 | | |
| Goldfield Daisy | 1.34 | | |
| Great Bend | .40 | | |
| Jumbo Extension | .31 | | |
| Katherine | ... | | |
| Kendall | .20 | | |
| Lone Star | .08 | | |
| May Queen | .08 | | |
| Oro | .10 | | |
| Red Hill | .25 | | |
| Roanoke | ... | | |
| Sandstorm | .33 | | |

| COLO. SPRINGS | May 2 |
|---|---|
| Name of Comp. | Clg. |
| Acacia | 6¼ |
| Black Bell | .... |
| C. C. Con | 3⅝ |
| Dante | 9 |
| Doctor Jack Pot. | 7½ |
| Elkton | 53½ |
| El Paso | 34¼ |
| Findlay | 25 |
| Gold Dollar | 6 |
| Gold Sovereign | 3⅝ |
| Isabella | 34 |
| Index | .... |
| Jennie Sample | ‡2⅝ |
| Jerry Johnson | .... |
| Mary McKinney | .... |
| Pharmacist | .... |
| Portland | 1.01 |
| Un. Gold Mines | ‡4½ |
| Vindicator | .... |
| Work | 11 |

### New Dividends

| Company. | Payable. | Rate. | Amt. |
|---|---|---|---|
| Alaska Mexican | Apr. 28 | $0.50 | $ 90,000 |
| Alaska Treadwell | Apr. 28 | 0.75 | 150,000 |
| Amalgamated | May 25 | 0.50 | 765,439 |
| Bunker Hill & Sullivan | May 4 | 0.25 | 75,000 |
| Calumet & Arizona | Apr. 25 | 1.00 | 200,000 |
| Consolidation Coal | Apr. 30 | 1.50 | 153,750 |
| Elkton | Apr. 24 | 0.01½ | 37,500 |
| Esperanza | Apr. 18 | 1.09 | 495,950 |
| Hecla | Apr. 20 | 0.01 | 10,000 |
| Homestake | Apr. 25 | 0.50 | 109,200 |
| Inter. Nickel, pfd. | May 1 | 1.50 | 131,123 |
| Jamison | Apr. 18 | 0.02 | 7,800 |
| Kerr Lake | Apr. 15 | 0.15 | 90,000 |
| Lehigh Coal & Nav. | May 27 | 2.00 | 639,802 |
| Nipissing | Apr. 20 | 0.15 | 180,000 |
| N. Y. & Hond. Rosario | Apr. 25 | 0.10 | 15,000 |
| Penn. Salt Mfg. | Apr. 15 | 3.00 | 180,000 |
| Portland | Apr. 15 | 0.04 | 120,000 |
| Silver Queen | May 15 | 0.05 | 75,000 |
| United States, com. | Apr. 15 | 0.50 | 175,466 |
| United States, pfd | Apr. 15 | 0.87½ | 425,114 |
| U. S. Steel, com. | June 30 | 0.50 | 2,541,513 |
| U. S. Steel, pfd | June 1 | 1.75 | 6,305,497 |
| Utah Con | Apr. 15 | 0.50 | 150,000 |
| Va. Car. Chem., pfd. | Apr. 15 | 2.00 | 360,000 |
| Vindicator | Apr. 25 | 0.04 | 60,000 |

### Assessments

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Andes, Nev. | Apr. 23 | May 15 | $0.10 |
| Belcher, Nev. | Apr. 29 | May 20 | 0.10 |
| Big Creek, Ida | Apr. 17 | May 16 | 0.01 |
| Brunswick Con., Cal. | May 27 | June 26 | 0.03 |
| Butler-Liberal, Utah | Apr. 25 | May 13 | 0.02 |
| Century, Utah | Apr. 14 | May 14 | 0.02 |
| Charm, Utah | Apr. 31 | May 13 | 0.01 |
| Federal | Apr. 25 | May 18 | 0.05 |
| Jenny Lind, Cal. | May 11 | May 28 | 0.05 |
| New Red Wing, Utah | May 2 | May 19 | 0.01 |
| Old Evergreen | Apr. 14 | May 14 | 0.01 |
| Oro Cobre, Cal. | Apr. 17 | May 16 | 0.02 |
| Posey Canyon, Cal. | Apr. 28 | May 16 | 0.02 |
| Potosi, Nev. | Apr. 20 | May 3 | 0.10 |
| Quincy, Jr., Utah | Mar. 21 | Apr. 20 | 0.02 |
| Silver Bell, Utah | Apr. 10 | Apr. 27 | 0.01 |
| Wabash, Utah | May 9 | June 1 | 0.10 |
| Washakie-Nev., Nev. | Apr. 20 | May 7 | 0.15 |
| Western Mines, Nev. | Mar. 16 | Apr. 23 | 0.01½ |
| Zeibright, Cal. | May 12 | June 1 | 0.05 |

## Monthly Average Prices of Metals

### AVERAGE PRICE OF SILVER

| Month. | New York. | | London. | |
|---|---|---|---|---|
| | 1907. | 1908. | 1907. | 1908. |
| January | 68.673 | 55.678 | 31.769 | 25.736 |
| February | 68.835 | 56.000 | 31.852 | 25.855 |
| March | 67.519 | 55.365 | 31.325 | 25.570 |
| April | 65.462 | 54.505 | 30.253 | 25.133 |
| May | 65.981 | ..... | 30.471 | ..... |
| June | 67.090 | ..... | 30.893 | ..... |
| July | 68.144 | ..... | 31.366 | ..... |
| August | 68.745 | ..... | 31.637 | ..... |
| September | 67.792 | ..... | 31.313 | ..... |
| October | 62.435 | ..... | 28.863 | ..... |
| November | 58.677 | ..... | 27.154 | ..... |
| December | 54.565 | ..... | 25.362 | ..... |
| Year | 65.327 | ..... | 30.188 | ..... |

New York, cents per fine ounce; London, pence per standard ounce.

### AVERAGE PRICES OF COPPER

| | NEW YORK. | | | | LONDON. | |
|---|---|---|---|---|---|---|
| | Electrolytic | | Lake. | | | |
| | 1907. | 1908. | 1907. | 1908. | 1907. | 1908. |
| January | 24.404 | 13.726 | 24.825 | 13.901 | 106.739 | 62.386 |
| February | 24.869 | 12.905 | 25.236 | 13.098 | 107.356 | 58.786 |
| March | 25.065 | 12.704 | 25.560 | 12.875 | 106.594 | 58.761 |
| April | 24.224 | 12.743 | 25.260 | 12.928 | 98.625 | 58.331 |
| May | 24.048 | ..... | 25.072 | ..... | 102.375 | ..... |
| June | 22.665 | ..... | 24.140 | ..... | 97.272 | ..... |
| July | 21.130 | ..... | 21.923 | ..... | 95.016 | ..... |
| August | 18.356 | ..... | 19.255 | ..... | 79.679 | ..... |
| September | 15.565 | ..... | 16.047 | ..... | 68.375 | ..... |
| October | 13.169 | ..... | 13.551 | ..... | 60.717 | ..... |
| November | 13.391 | ..... | 13.870 | ..... | 61.226 | ..... |
| December | 13.163 | ..... | 13.393 | ..... | 60.113 | ..... |
| Year | 20.004 | ..... | 20.661 | ..... | 87.007 | ..... |

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

### AVERAGE PRICE OF TIN AT NEW YORK

| Month. | 1907. | 1908. | Month. | 1907. | 1908. |
|---|---|---|---|---|---|
| January | 41.548 | 27.380 | July | 41.091 | ..... |
| February | 42.102 | 28.978 | August | 37.667 | ..... |
| March | 41.313 | 30.577 | September | 36.689 | ..... |
| April | 40.938 | 31.702 | October | 32.620 | ..... |
| May | 43.149 | ..... | November | 30.833 | ..... |
| June | 42.120 | ..... | December | 27.925 | ..... |
| | | | Av. year | 38.166 | ..... |

Prices are in cents per pound.

### AVERAGE PRICE OF LEAD

| Month. | New York. | | London. | |
|---|---|---|---|---|
| | 1907. | 1908. | 1907. | 1908. |
| January | 6.000 | 3.691 | 19.828 | 14.469 |
| February | 6.000 | 3.725 | 19.531 | 14.250 |
| March | 6.000 | 3.838 | 19.703 | 13.975 |
| April | 6.000 | 3.993 | 19.975 | 13.469 |
| May | 6.000 | ..... | 19.688 | ..... |
| June | 5.760 | ..... | 20.188 | ..... |
| July | 5.288 | ..... | 20.350 | ..... |
| August | 5.250 | ..... | 19.063 | ..... |
| September | 4.813 | ..... | 19.775 | ..... |
| October | 4.750 | ..... | 18.531 | ..... |
| November | 4.376 | ..... | 17.281 | ..... |
| December | 3.658 | ..... | 14.500 | ..... |
| Year | 5.325 | ..... | 19.034 | ..... |

New York, cents per pound. London, pounds sterling per long ton.

### AVERAGE PRICE OF SPELTER

| MONTH. | New York. | | St. Louis. | | London. | |
|---|---|---|---|---|---|---|
| | 1907. | 1908. | 1907. | 1908. | 1907. | 1908. |
| January | 6.732 | 4.513 | 6.582 | 4.363 | 27.125 | 20.563 |
| February | 6.814 | 4.788 | 6.664 | 4.638 | 25.938 | 20.875 |
| March | 6.837 | 4.665 | 6.687 | 4.527 | 26.094 | 21.075 |
| April | 6.685 | 4.645 | 6.535 | 4.495 | 25.900 | 21.344 |
| May | 6.441 | ..... | 6.291 | ..... | 25.563 | ..... |
| June | 6.419 | ..... | 6.269 | ..... | 25.469 | ..... |
| July | 6.072 | ..... | 5.922 | ..... | 23.850 | ..... |
| August | 5.701 | ..... | 5.551 | ..... | 21.969 | ..... |
| September | 5.236 | ..... | 5.086 | ..... | 21.050 | ..... |
| October | 5.430 | ..... | 5.280 | ..... | 21.781 | ..... |
| November | 4.925 | ..... | 4.775 | ..... | 21.438 | ..... |
| December | 4.254 | ..... | 4.104 | ..... | 20.075 | ..... |
| Year | 5.962 | ..... | 5.812 | ..... | 23.771 | ..... |

New York and St. Louis, cents per pound. London in pounds sterling per long ton.